



**HEWLETT  
PACKARD**

**OPERATING AND INSTALLATION  
MANUAL**

**7911, 7912, AND 7914  
DISC/TAPE DRIVES**

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**MODELS COVERED**

This manual covers the HP 7911R, HP 7911P, HP 7912R,  
HP 7912P, HP 7914R, and HP 7914P Disc/Tape Drives.

**OPTIONS COVERED**

This manual covers options 001, 015, and 140 as well as  
the standard disc/tape drives.



**HP-IB: Not just IEEE-488, but the  
hardware, documentation and  
support that delivers the shortest  
path to a computation system.**

**FOR U.S.A. ONLY**

The Federal Communications Commission (in 47 CFR 15.818) has specified that the  
following notice be brought to the attention of the users of this product.

**FEDERAL COMMUNICATIONS COMMISSION  
RADIO FREQUENCY INTERFERENCE STATEMENT**

**Warning:** This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

The above statement applies only to stand-alone cabinet model disc/tape drives (HP 7911P, HP 7912P, and HP 7914P). The rackmount model disc/tape drives (HP 7911R, HP 7912R, and HP 7914R) are sold as component products and are incomplete in nature. These products have not been tested to comply with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules which are designed to provide reasonable protection against such interference when operated in a commercial environment. When installed in a complete computing device product, these units require testing to the Class A limits.

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# SAFETY CONSIDERATIONS

## KEEP WITH MANUAL

**GENERAL** - This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation.

### SAFETY SYMBOLS



Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the product against damage.



Indicates hazardous voltages.



Indicates earth (ground) terminal.

### WARNING

The **WARNING** sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in injury. Do not proceed beyond a **WARNING** sign until the indicated conditions are fully understood and met.

### CAUTION

The **CAUTION** sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond a **CAUTION** sign until the indicated conditions are fully understood and met.

**SAFETY EARTH GROUND** - This is a safety class I product and is provided with a protective earthing terminal. An uninterruptible safety earth ground must be provided from the main power source to the product input wiring terminals, power cord, or supplied power cord set. Whenever it is likely that the protection has been impaired, the product must be made inoperative and be secured against any unintended operation.

**BEFORE APPLYING POWER** - Verify that the product is configured to match the available main power source per the input power configuration instructions provided in this manual.

If this product is to be energized via an autotransformer (for voltage reduction) make sure the common terminal is connected to the earth terminal of the main power source.

### SERVICING

#### WARNING

Any servicing, adjustment, maintenance, or repair of this product must be performed only by service-trained personnel.

Adjustments described in this manual may be performed with power supplied to the product while protective covers are removed. Energy available at many points may, if contacted, result in personal injury.

Capacitors inside this product may still be charged even when disconnected from its power source.

To avoid a fire hazard, only fuses with the required current rating and of the specified type (normal blow, time delay, etc.) are to be used for replacement.

To install or remove a fuse, first disconnect the power cord from the device. Then, using a small screwdriver, turn the fuseholder cap counterclockwise until the cap releases. Install the proper fuse in the cap — either end of the fuse can be installed in the cap. Next, install the fuse and fuseholder cap in the fuseholder by pressing the cap inwards and then turning it clockwise until it locks in place.



# GENERAL INFORMATION

## SECTION

## I

### 1-1. INTRODUCTION

The HP 7911, HP 7912, and HP 7914 Disc/Tape Drives (see figure 1-1), hereafter referred to as drives, are medium performance, random access data storage devices. The formatted capacities of the HP 7911, HP 7912, and HP 7914 are 28.1 megabytes, 65.6 megabytes, and 132.1 megabytes, respectively. The drives come in two configurations: a stand-alone cabinet ("P" version) or a rackmount ("R" version). The following information applies to all models unless otherwise specified. All information in this manual should only be used by service-trained personnel.

Each drive is manufactured complete with a Hewlett-Packard Interface Bus (HP-IB)\* controller. The dual-controller configuration (option 001) provides separate dedicated controllers for the disc unit and the tape unit. Drive operations are controlled by the CS/80 Instruction Set for mass storage devices. The CS/80 Instruction Set has been written to increase the efficiency and speed of channel operations between mass storage devices and their associated host computers.

Each drive (except option 140) includes a cartridge tape unit. This unit uses a DC 600 type preformatted data cartridge that provides either 16.7 megabytes (150-foot) or 67 megabytes (600-foot) of storage. Tapes are ordered in groups of five per box. To upgrade an option 140 disc drive to a standard disc/tape drive, refer to the *Cartridge Tape Drive Upgrade Manual*, part no. 5957-6471.

### 1-2. ACCESSORIES

The accessories listed in table 1-1 may be ordered from your local Hewlett-Packard Sales and Support Office. Sales and Support Offices are listed at the back of this manual. Table 1-2 lists the items that are included in the accessories box shipped with each drive.

### 1-3. PRODUCT CHARACTERISTICS

Characteristics of the drives are listed in table 1-3.

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*\*HP-IB: Not just IEEE-488, but the hardware, documentation and support that delivers the shortest path to a computation system.*

Table 1-1. Available Accessories

HP Order No.	Description
92170G	Table (compatible with stand-alone drives)
88140SC	Certified 16.7 megabyte Tape Cartridge (box of 5)
88140LC	Certified 67.0 megabyte Tape Cartridge (box of 5)
8500-1251	Head Cleaner, 118 millilitre (4 ounce) metal can (for refilling plastic bottle)
9300-0767	Cleaning Swabs (package of 10)

## WARNING

All products which utilize tape head cleaner are shipped with a Material Safety Data Sheet (MSDS). Follow all applicable safety precautions when using the tape head cleaner.

### 1-4. AVAILABLE OPTIONS

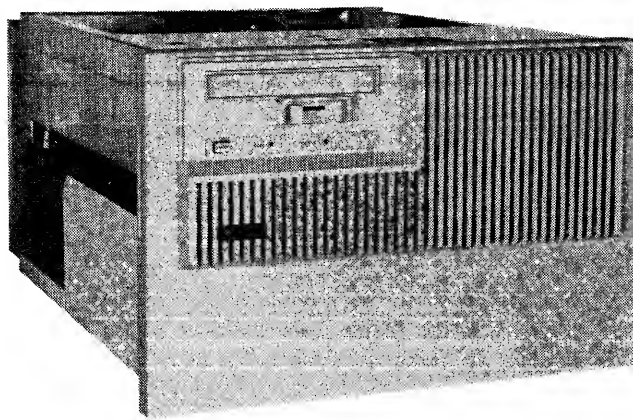
Table 1-4 lists the options available with the drives.

### 1-5. SUPPORTING DOCUMENTATION

The following documentation may be ordered from a Hewlett-Packard Sales and Support Office:

- *HP 7911, HP 7912, and HP 7914 Disc/Tape Drive Service Manual*, part no. 07912-90903.
- *CS/80 Instruction Set Programming Manual*, part no. 5955-3442.
- *CS/80 External Exerciser Manual*, part no. 5955-3462.

RACKMOUNT  
DRIVE



STAND-ALONE  
DRIVE

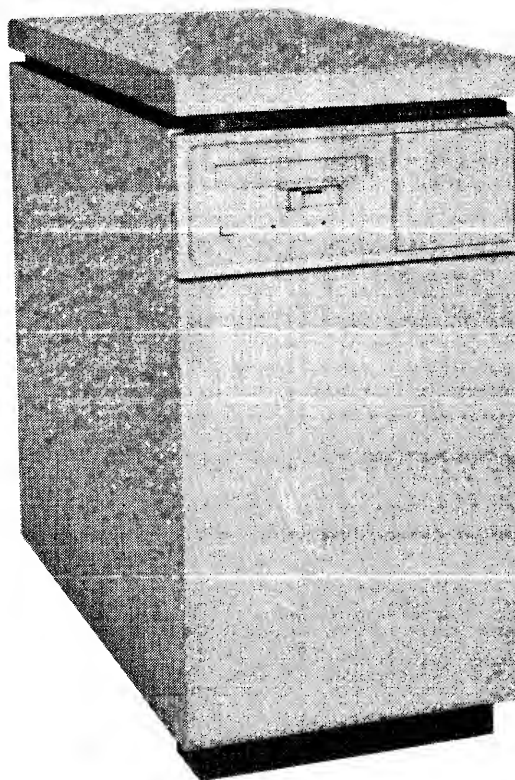


Figure 1-1. Rackmount and Stand-Alone Drives



Table 1-2. Accessories Box Contents

<b>STANDARD MODEL**</b>					
<b>STAND-ALONE CABINET</b>			<b>RACKMOUNT</b>		
<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>QTY</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>QTY</b>
10833A	HP-IB Cable, 1-metre	1	10833B	HP-IB Cable, 2-metre	1
07912-90901	Operator Instructions Manual	1	07912-90901	Operator Instructions Manual	1
07912-90902	Operating and Installation Manual	1	07912-90902	Operating and Installation Manual	1
5955-3456	Site Environmental Requirements Manual	1	5955-3456	Site Environmental Requirements Manual	1
N/A	Manual Updates (as required)	1	N/A	Manual Updates (as required)	1
8500-3440	Head Cleaner	1	8500-3440	Head Cleaner	1
9300-0767	Cleaning Swabs	10	9300-0767	Cleaning Swabs	10
5957-6473	Material Safety Data Sheet	1	5957-6473	Material Safety Data Sheet	1
N/A	600-foot Certified Tape Cartridge	1*	N/A	Mounting Screws	14
N/A	Remainder of Voltage Labels	1 pkg	N/A	600-foot Certified Tape Cartridge	1*
			N/A	Remainder of Voltage Labels	1 pkg
<b>OPTION 001</b>					
<b>STAND-ALONE CABINET</b>			<b>RACKMOUNT</b>		
<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>QTY</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>QTY</b>
10833A	HP-IB Cable, 1-metre	2	10833B	HP-IB Cable, 2-metre	2
07912-90901	Operator Instructions Manual	1	07912-90901	Operator Instructions Manual	1
07912-90902	Operating and Installation Manual	1	07912-90902	Operating and Installation Manual	1
5955-3456	Site Environmental Requirements Manual	1	5955-3456	Site Environmental Requirements Manual	1
5957-8915	Cartridge Tape Drive User's Guide	1	5957-8915	Cartridge Tape Drive User's Guide	1
N/A	Manual Updates (as required)	1	N/A	Manual Updates (as required)	1
8500-3440	Head Cleaner	1	8500-3440	Head Cleaner	1
9300-0767	Cleaning Swabs	10	9300-0767	Cleaning Swabs	10
5957-6473	Material Safety Data Sheet	1	5957-6473	Material Safety Data Sheet	1
N/A	600-foot Certified Tape Cartridge	1*	N/A	Mounting Screws	14
N/A	Remainder of Voltage Labels	1 pkg	N/A	600-foot Certified Tape Cartridge	1*
			N/A	Remainder of Voltage Labels	1 pkg
<b>OPTION 140</b>					
<b>STAND-ALONE CABINET</b>			<b>RACKMOUNT</b>		
<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>QTY</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>QTY</b>
10833A	HP-IB Cable, 1-metre	1	10833B	HP-IB Cable, 2-metre	1
07912-90901	Operator Instructions Manual	1	07912-90901	Operator Instructions Manual	1
07912-90902	Operating and Installation Manual	1	07912-90902	Operating and Installation Manual	1
5955-3456	Site Environmental Requirements Manual	1	5955-3456	Site Environmental Requirements Manual	1
N/A	Manual Updates (as required)	1	N/A	Manual Updates (as required)	1
N/A	Remainder of Voltage Labels	1 pkg	N/A	Mounting Screws	14
			N/A	Remainder of Voltage Labels	1 pkg
<p>* Add a second 600-foot tape for 7914.</p> <p>** On all option 015 drives a yellow jumper wire and a 10 amp fuse (2110-0051) are included in the accessories box.</p>					

Table 1-3. Drive Characteristics

<b>Safety</b>		
<ul style="list-style-type: none"><li>• All drives — CSA certified to CSA 22.2 No. 143 and No. 154.</li><li>• All drives — Meets all applicable safety standards of IEC 435.</li><li>• Stand-alone drives — UL listed to UL 114 and UL 478.</li><li>• Rackmount drives — UL recognized to UL 114 and UL 478.</li></ul>		
<b>Physical Characteristics</b>		
	<b>Rackmount Drives</b>	<b>Stand-Alone Drives</b>
Height:	311 mm (12.25 in.)	720 mm (28.4 in.)
Width:	451 mm (17.75 in.)	354 mm (14.0 in.)
Depth:	705 mm (27.8 in.)	740 mm (29.1 in.)
Net weight:	67.2 kg (148 lb)	85.4 kg (188 lb)
Shipping weight:	89.9 kg (198 lb)	117.1 kg (258 lb)
<b>Power Characteristics</b>		
Voltage:	100/120/220/240V; +5%, -10%	
Frequency:	48 to 66 Hz	
Phase:	Single	
Power:	700 watts	
Line dropout:	No effect on performance for dropout equal to or less than one half cycle of the ac line. Greater than one half cycle interrupt, the drive may become “not ready”. Drive will return to “ready” within 60 seconds after normal power is restored.	
<b>Cooling Requirements</b>		
Allow 76.3 mm (3 in.) in front and rear for adequate air flow.		

Table 1-4. Available Options

OPTION NO.	DESCRIPTION
001	Dual-controller configuration. The disc unit and the tape unit are each provided with a dedicated controller.
015	Drive configured for 220V, 50 Hz operation.
140	Deletes the cartridge tape unit.

## 2-1. INTRODUCTION

This section contains information needed for a normal initial set-up and checkout of the drives. This section also contains information necessary for shipment of the drives, therefore, it should be retained for reference. For servicing, refer to the *HP 7911, HP 7912, and HP 7914 Disc/Tape Drive Service Manual*, part no. 07912-90903. Refer to *Site Environmental Requirements for Disc/Tape Drives*, part no. 5955-3456, for environmental information related to installation.

## 2-2. UNPACKING AND INSPECTION

The drive is shipped in a reusable container. When the shipment arrives, ensure that the container has been received as specified by the carrier's bill of lading. Inspect the shipping container immediately upon receipt for evidence of mishandling during transit. If the container is damaged or water-stained, request that the carrier's agent be present when the container is unpacked.

The drive comes in two configurations: a stand-alone cabinet and a rackmount. The two configurations require different unpacking procedures.

If the container appears to be in satisfactory condition, proceed with the unpacking instructions.

## 2-3. UNPACKING RACKMOUNT DRIVES

### CAUTION

To avoid damage to the drive, do not apply any sudden mechanical shocks to it.

### CAUTION

The drive is shipped with the spindle and actuator locked. To avoid damage to the disc mechanism, do not unlock the spindle and actuator until the drive has been moved to its installation site.

- Locate the packing list and compare this list against the purchase order to verify that the shipment is correct.
- Cut the container polystrap bands (see figure 2-1).

- Lift the container top from the pallet base.
- Remove the accessories box and front panel (in bubble pack).
- Lift the protective cover from the drive.
- Cut the device polystrap bands.

### WARNING

The drive weighs approximately 67 kg (148 lb); more than one person may be required to lift it from the pallet base.

- Lift the drive off the pallet base and remove the plastic bag.
- Visually inspect the drive for damage.
- If a visual examination reveals any damage to the drive, follow the claims procedure described in paragraph 2-7.

Note: Retain the shipping container and packing material for future use.

## 2-4. UNPACKING STAND-ALONE DRIVES

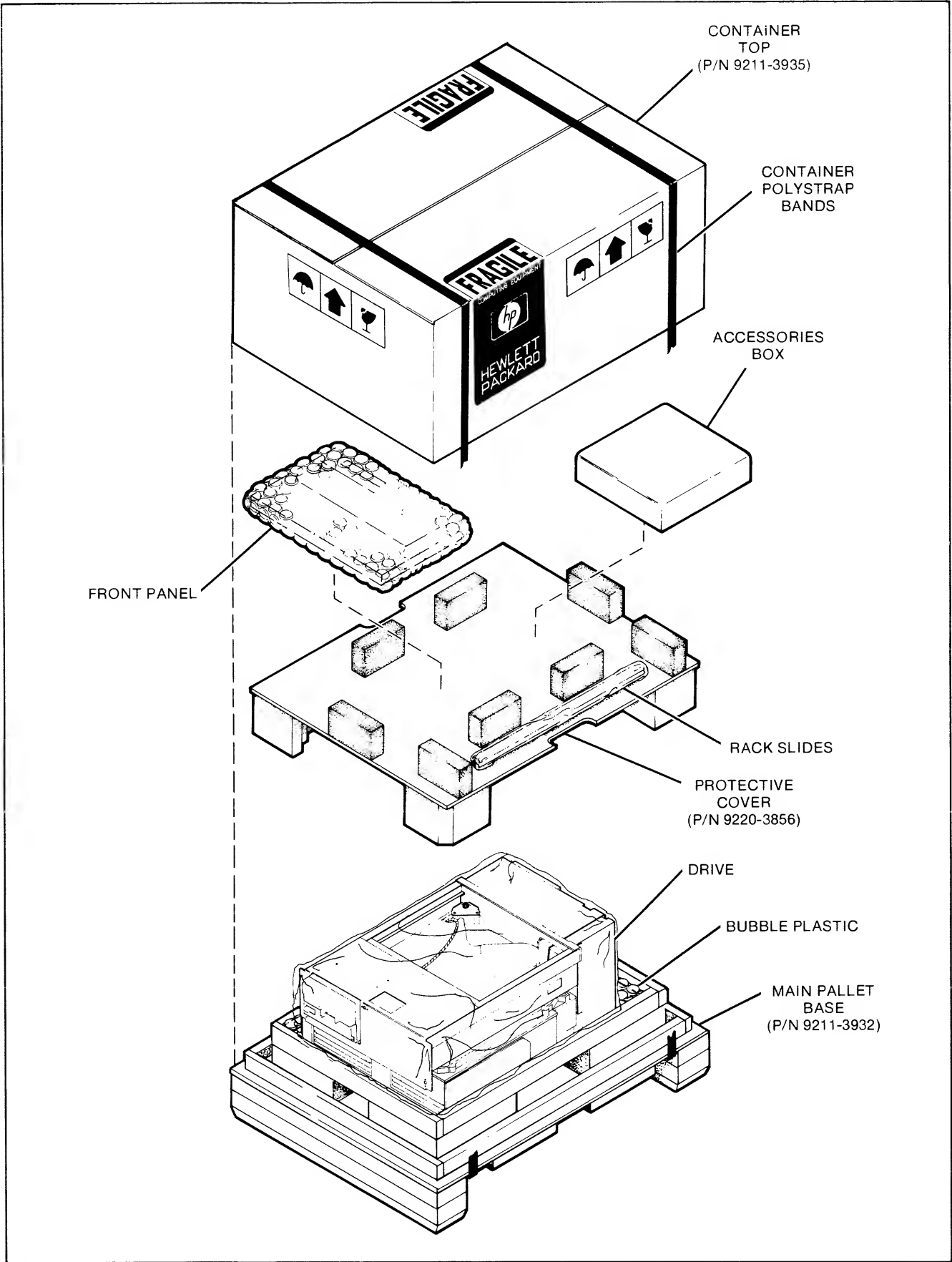
### CAUTION

To avoid damage to the drive, do not apply any sudden mechanical shocks to it.

### CAUTION

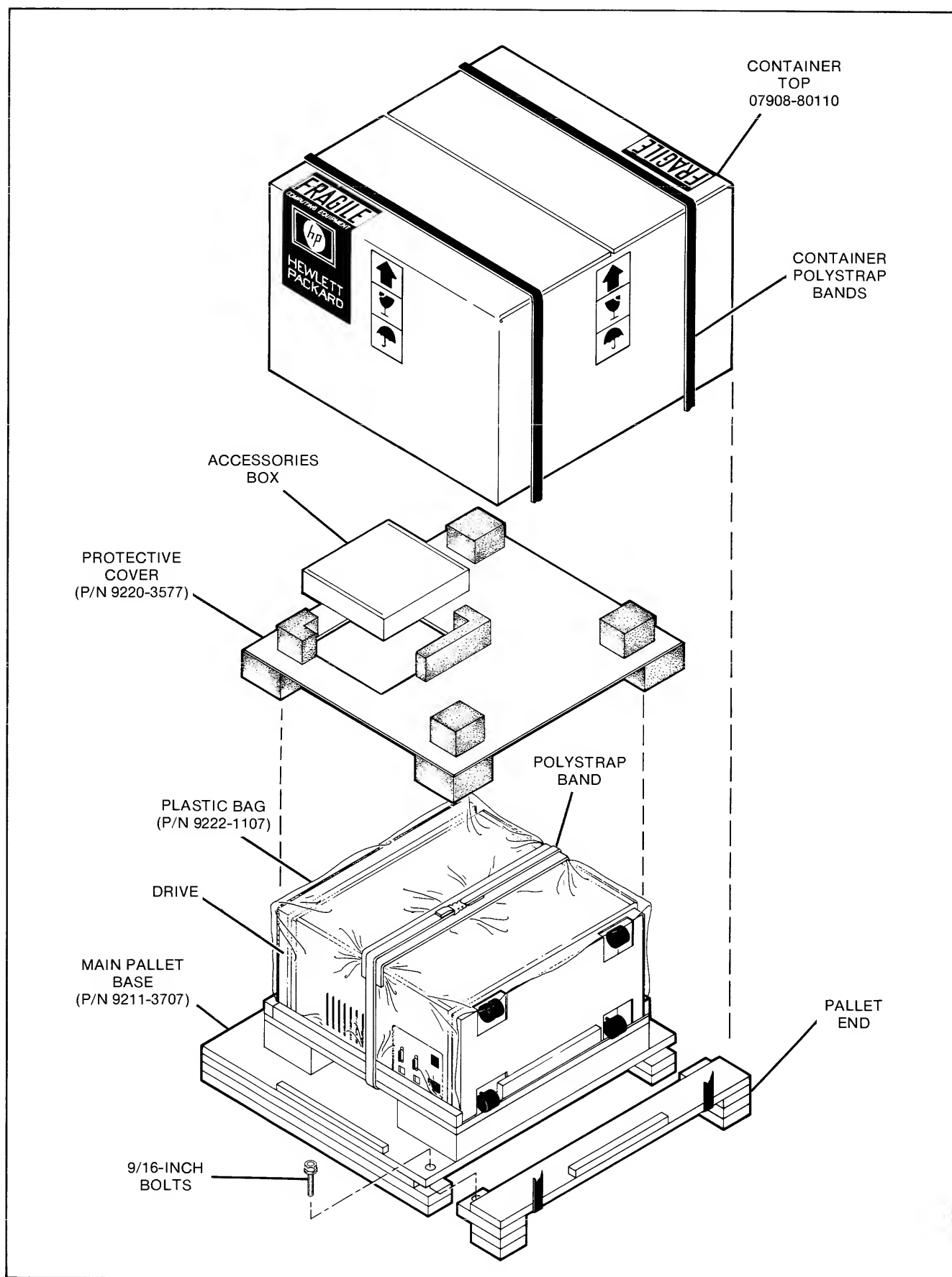
The drive is shipped with the spindle and actuator locked. To avoid damage to the disc mechanism, do not unlock the spindle and actuator until the drive has been moved to its installation site.

- Locate the packing list and compare this list against the purchase order to verify that the shipment is correct.
- Cut the container polystrap bands (see figure 2-2).
- Lift the container top from the pallet base.
- Remove the accessories box.



7912-10A

Figure 2-1. Rackmount Drive Shipping Package



7912-11E

Figure 2-2. Stand-Alone Drive Shipping Package

- e. Lift the protective cover from the drive.
- f. Using a 9/16-inch wrench, remove the two bolts that hold the pallet end to the main pallet base.
- g. Pull the pallet end from the main pallet base.
- h. Lift the other end of the main pallet base up until the casters on the drive rest firmly on the floor (see figure 2-3).
- i. Cut the polystrap band holding the drive to the main pallet base.
- j. Separate the drive from the pallet base.
- k. Cut the plastic bag and peel it off the drive. Do not pull the bag off the drive.
- l. Visually inspect the drive for damage.
- m. If a visual examination reveals any damage to the drive, follow the claims procedure described in paragraph 2-7.

Note: Retain the shipping container and packing material for future use.

## 2-5. MANUALS

The following manuals are shipped with each disc/tape drive:

- *HP 7912/7912/7914 Disc/Tape Drives Operator Instructions*, part no. 07912-90901.
- *HP 7911, 7912, and 7914 Disc/Tape Drives Operating and Installation Manual*, part no. 07912-90902.
- *Site Environmental Requirements for Disc/Tape Drives*, part no. 5955-3456.

## 2-6. EQUIPMENT

The drive model number and full serial number are stamped on an identification label located behind the pop-off front panel. Be sure to include the model number and serial number in any correspondence with Hewlett-Packard about this product.

## 2-7. CLAIMS PROCEDURE

### WARNING

**To avoid dangerous electrical shock, do not apply power to the drive when there are signs of physical damage to any portion of the outer enclosure.**

If the shipment is incomplete or if the equipment is damaged or fails to meet specifications, notify your nearest Hewlett-Packard Sales and Support Office. If damage occurred in transit, notify the carrier as well. Hewlett-Packard will arrange for replacement or repair without waiting for settlement of claims against the carrier. In the event of damage in transit, retain the shipping container(s) and packaging material for inspection.

## 2-8. SITE PREPARATION

### WARNING

**The drive does not contain operator-serviceable parts. To prevent electrical shock, refer all installation and maintenance activities to service-trained personnel.**

The site must be prepared in accordance with the information provided in the *Site Environmental Requirements for Disc/Tape Drives Manual*, part no. 5955-3456.

## 2-9. ENVIRONMENTAL REQUIREMENTS

### CAUTION

To avoid damage to the drive, ensure that it is operated within the limits specified in the manual listed in paragraph 2-8.

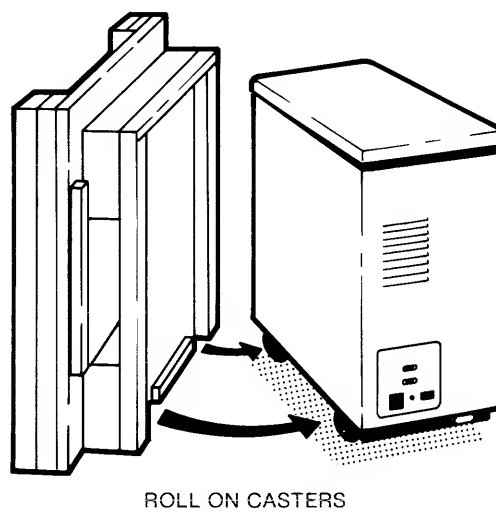
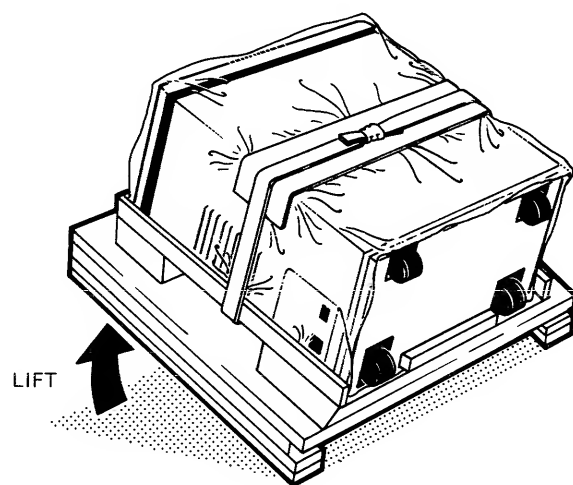
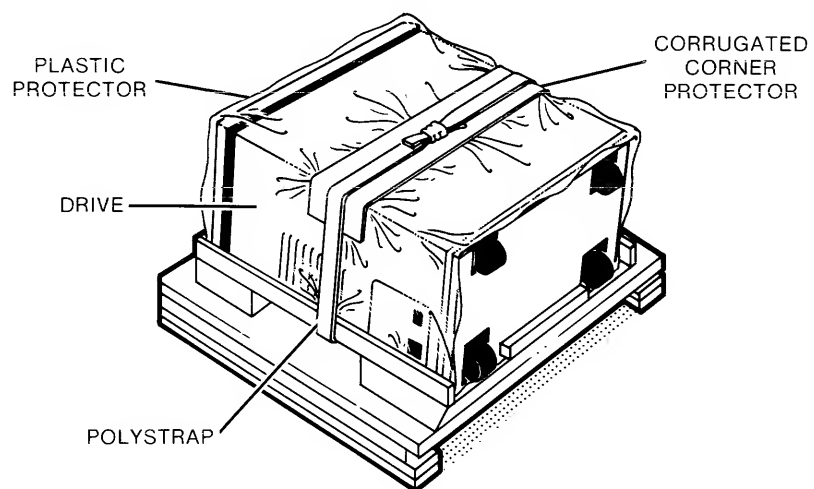
### CAUTION

The drive has been designed to operate within a temperature range of +10°C to +40°C (50°F to 104°F) with the rate of change not to exceed 10°C (18°F) per hour.

The drive has been designed to operate within the environmental limits specified in the manual listed in paragraph 2-8. Operation of the drive outside the specified limits may result in degradation or failure and may not be covered by warranty.

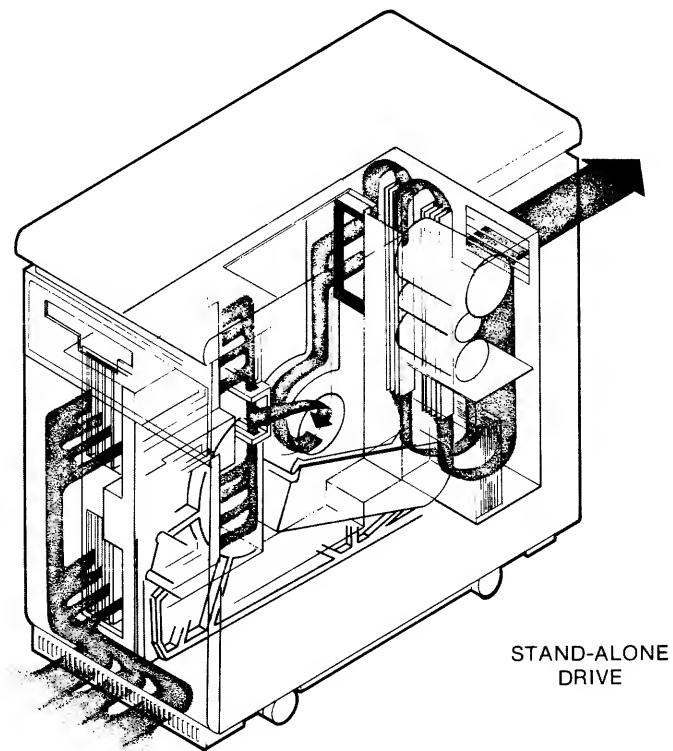
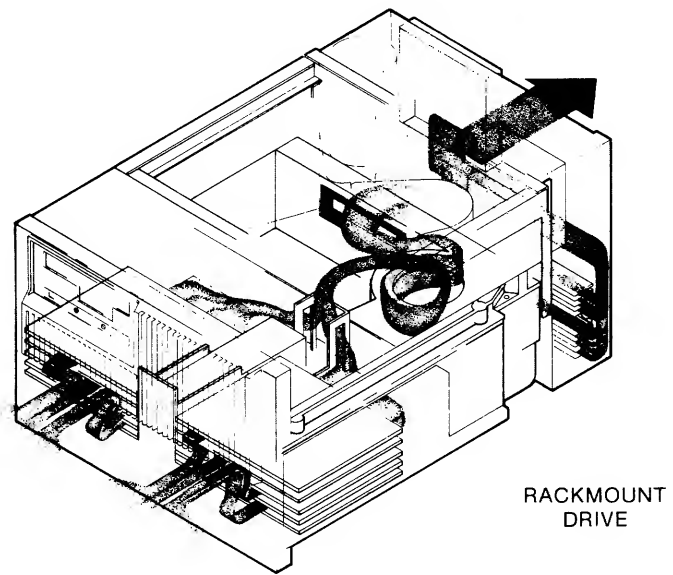
## 2-10. COOLING REQUIREMENTS

A fan in the drive provides adequate ventilation when the drive is operated in an appropriate environment (refer to the manual listed in paragraph 2-8). As shown in figure 2-4, cooling air is drawn into the drive through the front, and is exhausted through the rear panel.



7912-16  
7912-17  
7912-18

Figure 2-3. Stand-Alone Drive Unpacking



7912-30

Figure 2-4. Drive Internal Airflow



**Note:** To obtain maximum cooling efficiency, ensure that the airflow through the front and rear of the drive is not restricted. Leave at least 76 mm (3 in.) between the rear of the unit and the nearest wall.

## 2-11. MOUNTING REQUIREMENTS

### CAUTION

Do not operate stand-alone drives until the levelling feet have been lowered and are holding the drive in a stable, horizontal position.

Stand-alone drives are equipped with both casters and levelling feet. The casters should only be used when moving the drive; before operating the drive, the levelling feet must be lowered far enough so that the casters carry no weight. The levelling feet must all touch the floor holding the drive in a stable, horizontal position. A small, adjustable wrench will assist in adjustment of the levelling feet.

Rackmount drives are designed for mounting in a standard 48.3 cm (19 in.) wide system cabinet (rack).

## 2-12. RACK MOUNTING PROCEDURE

To mount rackmount drives, proceed as follows:

### WARNING

The drive weighs approximately 67 kg (148 lb); more than one person may be required to install it in the cabinet.

### WARNING

Before installing the drive, install the anti-tip feet on the cabinet. The anti-tip feet and the instructions for their installation are provided in the product support package, HP part no. 07914-67801.

**Note:** The drives will fit in only two HP cabinet models: the HP 29429A and the HP 29431E. To facilitate mounting in some non-HP cabinets, the rack mount ears can be moved forward to a position even with the front of the rack mount chassis.

- a. Install the anti-tip feet on the cabinet (see figure 2-5). The anti-tip feet and the instructions for their installation are provided in the product support package, part no. 07914-67801.

- b. Install the rack slides in the cabinet using the four 10-32 slot-head screws provided (see figure 2-5). The slides must be partially extended to gain access to the front mounting holes.

**Note:** When installing the rack slides, ensure the mounting pin on the top of the rack slide is pointing up (see figure 2-5, detail A). This will eliminate the possibility of installing the rack slides incorrectly (e.g., the righthand slide on the left side of the cabinet).

- c. Tighten the rack slide mounting screws to 25 inch-pounds.
- d. Extend the slides until the slide lockouts engage.

### WARNING

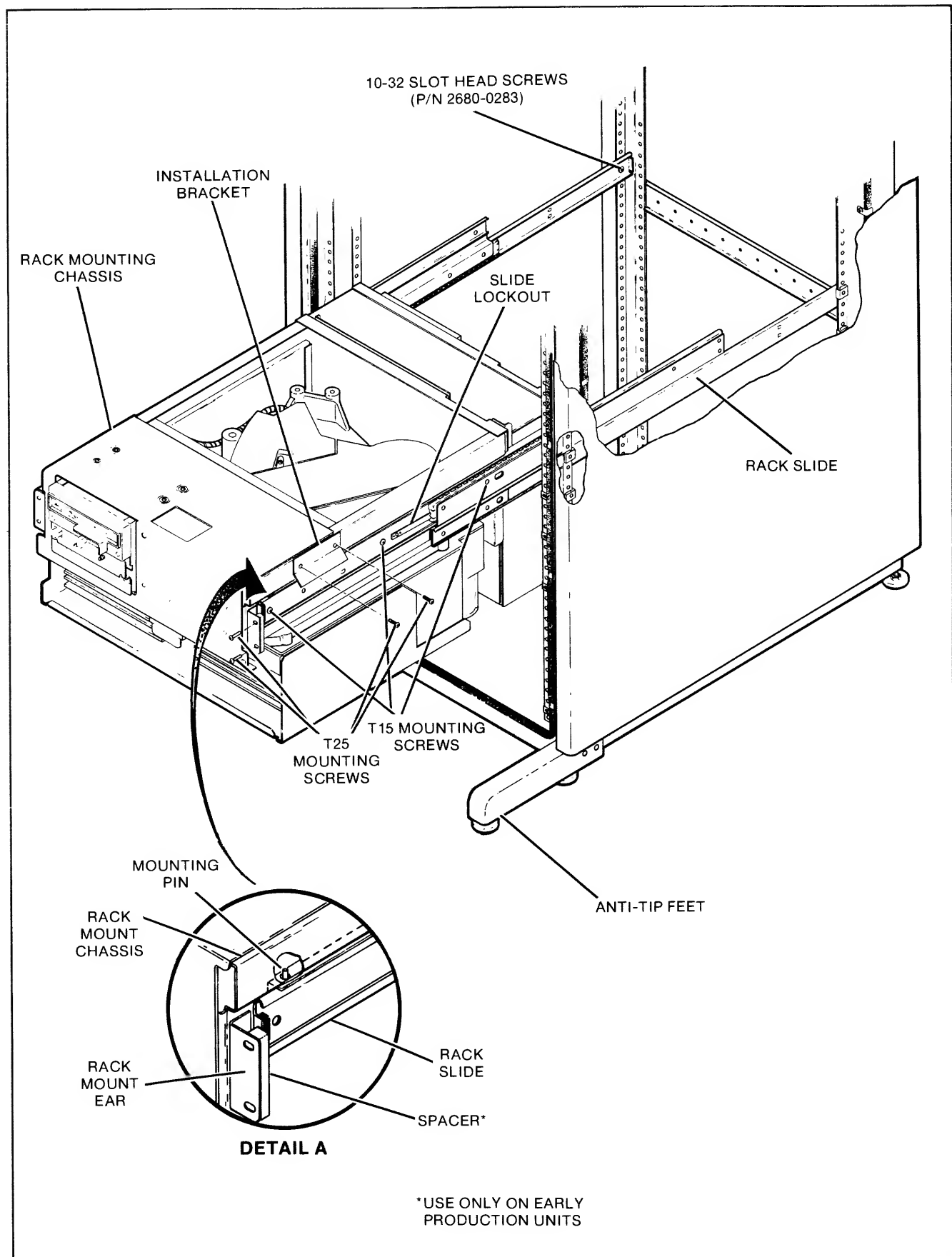
**When lowering the drive onto the rack slides, do not release the drive until the weight of the drive is supported by the installation brackets.**

- e. Lower the drive onto the rack slides, ensuring that the installation brackets fit over the rack slides.
- f. Move the drive along the rack slides until the mounting pins on the rack slides engage the mounting holes in the rack mount chassis (see figure 2-5, detail A).

**Note:** TORX® hardware is used extensively throughout the drive. Removal and installation of this hardware requires the use of special drivers (refer to table 2-1). Any reference to the type of hardware will be accompanied by the appropriate driver size (e.g., T15).

- g. Install the six T15 mounting screws in the following order:
  - (1) First, install a screw in the front mounting hole of each rack slide.
  - (2) Next, install a screw in the middle mounting hole of each rack slide.
  - (3) Last, install a screw in the rear mounting hole of each rack slide.
- h. Tighten all six T20 mounting screws 12 inch-pounds.
- i. Remove the installation brackets from the rack mount chassis.

**Note:** Keep the installation brackets and the attaching screws. They must be re-used whenever the drive is removed and reinstalled in the rack.



7912-15A

Figure 2-5. Rack Installation

Table 2-1. Special Tools

TOOL	HP PART NO.
Variable Torque Driver	1535-2653
Torque Wrench	8710-1007
Coupler	8710-1457
TORX® Driver Kit	8710-1426
(includes the following items)	
Bit, T6	8710-1424
Bit, T7	8710-1423
Bit, T8	8710-1422
Bit, T9	8710-1421
Bit, T10	8710-1418
Bit, T10, 3.5 in. long	8710-1465
Bit, T15	8710-1415
Bit, T20	8710-1416
Bit, T25	8710-1417
Bit, T27	8710-1420
Bit, T30	8710-1419
Extension	8710-1425
Driver Handle	8710-1413
Pouch	8710-1412

TORX® is a registered trademark of the Camcar Division of Textron, Inc.

- j. Depress the slide lockouts and push the drive into the cabinet.
- k. If supplied as part of the mounting hardware, install the rack spacers between the rack mounting chassis ears and the cabinet.
- l. Install the four T25 mounting screws that secure the drive to the cabinet. Tighten the four screws to 12 inch-pounds.
- m. Install the front panel by pushing it into place.
- n. Remove the anti-tip feet from the cabinet.

To remove the drive from the cabinet, reverse the above procedure.

## 2-13. INSTALLATION INFORMATION

The following paragraphs provide the necessary information to install the drive. The information includes instructions on updating manuals, tools and test equipment required for installation, preparation procedures, spindle and actuator locks, ac outlet and external ground requirements, power cord information, and HP-IB considerations.

## 2-14. UPDATING MANUALS

Before installing the drive, read all updating supplements for the drive manuals and any related manuals. Updating supplements (if any) are provided with the appropriate manual.

## 2-15. TOOLS AND TEST EQUIPMENT REQUIRED

**2-16. TOOLS.** Table 2-1 lists the special tools which, in addition to ordinary tools, are required to install the drive.

**Note:** TORX® hardware is used extensively throughout the drive. Removal and installation of this hardware requires the use of special drivers (refer to table 2-1). Any reference to the type of hardware will be accompanied by the appropriate driver size (e.g., T15).

**2-17. TEST EQUIPMENT.** Test equipment capable of measuring the limits of the environmental and power specifications is required during installation of the drive.

## 2-18. PREPARATION PROCEDURES

### WARNING

**To avoid dangerous electrical shock, do not perform any removal/replacement operation until the ac mains power is removed from the drive.**

Installation of the drive requires that the power cord be disconnected. To remove the power cord, proceed as follows:

### CAUTION

Do not attempt to operate the drive if the spindle and actuator have not been unlocked.

- a. Set the power switch on the rear panel to the 0 (off) position.
- b. Disconnect the ac power cord from the wall outlet and from the receptacle on the rear of the drive.

Installation of the drive requires that the HP-IB cable(s) be disconnected. Disconnect the HP-IB cable(s) as follows:

### CAUTION

Do not connect or disconnect the HP-IB cable(s) from the drive while the system bus is in an active state.

- a. Loosen the two thumb screws which hold the HP-IB connector in place.
- b. Disconnect the HP-IB cable(s).

To reconnect the HP-IB cable(s), first ensure that the system bus is not in an active state, then reverse the procedure.

## **2-19. RACKMOUNT DRIVE FRONT PANEL REMOVAL AND REPLACEMENT**

Installation of rackmount drives requires removing the front panel. To remove this panel, proceed as follows:

- a. Perform preparation procedures (refer to paragraph 2-18.)
- b. Disconnect the ac power cord from the ac mains power.
- c. Remove the front panel by pulling it forward.

To replace, push the panel into place.

## **2-20. STAND-ALONE DRIVE PANEL REMOVAL AND REPLACEMENT**

Installation of stand-alone drives requires removing several access panels. The removal and replacement of these panels is covered in the following paragraphs.

**2-21. UPPER FRONT PANEL.** To remove the upper front panel, proceed as follows:

- a. Perform preparation procedures (refer to paragraph 2-18).
- b. Disconnect the ac power cord from the ac mains power.
- c. Remove the upper front panel by pulling it forward. To remove the filler panel (Option 140), remove the two T15 mounting screws located beneath the panel.

To replace, push the panel into place.

**2-22. LOWER FRONT PANEL.** To remove the lower front panel, proceed as follows:

- a. Perform preparation procedures (refer to paragraph 2-18).
- b. Disconnect the ac power cord from the ac mains power.
- c. Remove the lower front panel by pulling it forward from the top and sliding it up and out of the base.

To replace, slide the bottom tabs into the base and push the top into place.

**2-23. FLIP-TOP ASSEMBLY.** To remove the flip-top assembly, proceed as follows:

- a. Perform preparation procedures (refer to paragraph 2-18).
- b. Disconnect the ac power cord from the ac mains power.
- c. Remove the following items:
  - Lower front panel (refer to paragraph 2-22)
  - Upper front panel (refer to paragraph 2-21)
- d. Remove the four T15 screws which hold the flip-top to the front of the cabinet base.
- e. Rotate the flip-top upward from the front of the cabinet to the rear and rest the flip-top on the rear panel.
- f. Remove the two screws that secure the ground straps to the flip-top assembly.
- g. Disengage the flip-top assembly from the cabinet base.

To install the flip-top, proceed as follows:

- a. Engage the bottom rear tabs of the flip-top with the bottom rear portion of the cabinet base and rest the flip-top on the rear panel.
- b. Using the two screws removed in step f above, install the two ground straps.
- c. Rotate the flip-top until it is resting on and aligned with the cabinet front frame.
- d. Install the four T15 screws removed in step d above, and tighten to 25 in.-lb.
- e. Install the items removed in step c above.

## **2-24. SHIPPING LOCKS**

The drives are equipped with locks (see figure 2-6) for the disc spindle and actuator. These locks are designed to protect the disc mechanism during shipment of the drive. Before operating the drive, the shipping locks must be set to the OPERATE position. The spindle and actuator should not be unlocked until the drive has been moved to its installation site.

**2-25. UNLOCKING RACKMOUNT DRIVE SHIPPING LOCKS.** To unlock the spindle and actuator, proceed as follows:

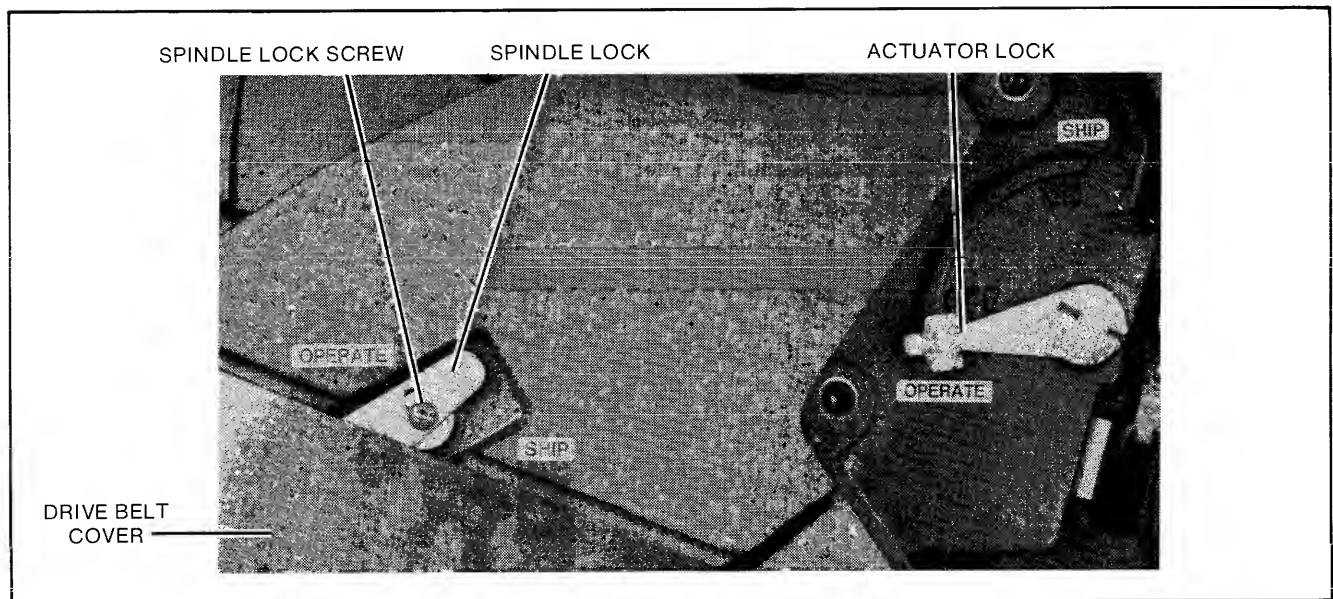


Figure 2-6. Shipping Locks

### CAUTION

Do not unlock the shipping locks until the drive has been installed in the rack.

- a. Perform preparation procedures (refer to paragraph 2-18).
- b. Disconnect the ac power cord from the ac mains power.
- c. Remove the following items:
  - Upper front panel (refer to paragraph 2-21)
  - Lower front panel (refer to paragraph 2-22)
  - Flip-top assembly (refer to paragraph 2-23)
- d. Unlock the actuator by moving the actuator lock to the OPERATE position (see figure 2-6).
- e. Loosen the T15 spindle lock screw.
- f. Using a flat blade screwdriver for increased leverage, move the spindle lock to the OPERATE position.
- g. Tighten the T15 spindle lock screw to 20 in.-lb.

To lock the disc mechanism prior to shipment, perform the above procedure but move the locks to the SHIP position.

Note: When locking the spindle, ensure that the spindle lock is wedged tightly under the spindle pulley.

**2-26. UNLOCKING STAND-ALONE DRIVE SHIPPING LOCKS.** To unlock the spindle and actuator, proceed as follows:

- a. Perform preparation procedures (refer to paragraph 2-18).
- b. Disconnect the ac power cord from the ac mains power.
- c. Remove the following items:
  - Upper front panel (refer to paragraph 2-21)
  - Lower front panel (refer to paragraph 2-22)
  - Flip-top assembly (refer to paragraph 2-23)
- d. Unlock the actuator by moving the actuator lock to the OPERATE position (see figure 2-6).
- e. Loosen the T15 spindle lock screw.
- f. Using a flat blade screwdriver for increased leverage, move the spindle lock to the OPERATE position.
- g. Tighten the T15 spindle lock screw to 20 in.-lb.
- h. Remove the foam spacer inserted between the disc mechanism and the power module.

Note: Retain the foam spacer for use if the drive must be repackaged for shipment.

To reassemble, install the items removed in step c.

To lock the disc mechanism prior to shipment, perform the above procedure but move the locks to the SHIP position. Also install the foam spacer removed in step h.

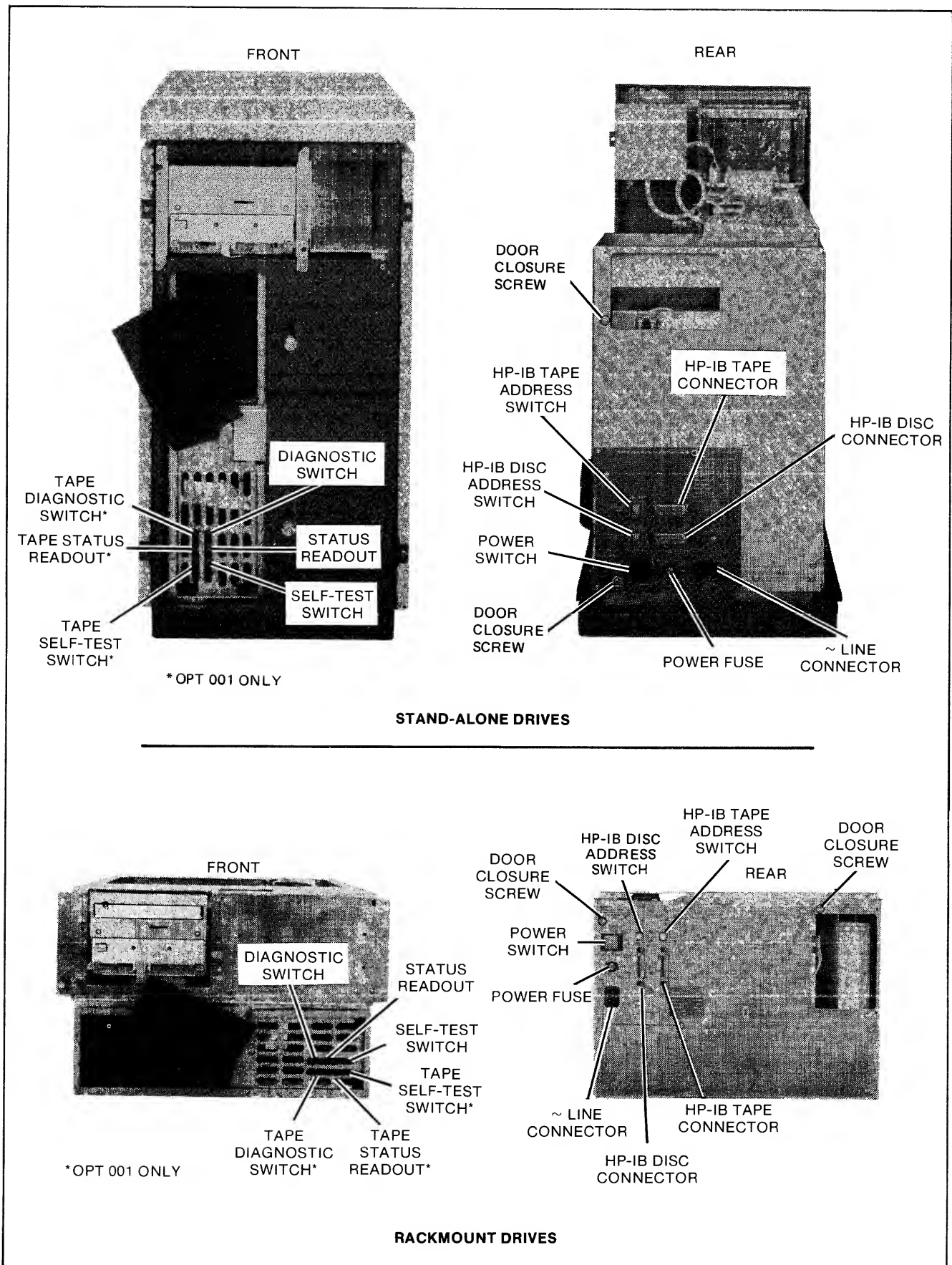


Figure 2-7. Front and Rear Panels

**Note:** When locking the spindle, ensure that the spindle lock is wedged tightly under the spindle pulley.

## 2-27. RESEATING CARD CAGE PCA's

During shipment, the card cage PCA's may become unseated. Before operating the disc/tape drive, all the card cage PCA's must be resealed. To reseal the PCA's, proceed as follows:

### CAUTION

To avoid damage to any PCA components, handle each PCA only by its edge.

- Perform preparation procedures (refer to paragraph 2-18).
- Disconnect the ac power cord from the ac mains power.
- To access the card cage on rackmount drives, remove the front panel (refer to paragraph 2-19); to access the card cage on stand-alone drives, remove the lower front panel (refer to paragraph 2-22).
- Loosen the two captive screws that hold the card cage shield in place.
- Remove the shield from the front of the card cage.
- Reseat all card cage PCA's.

### WARNING

When installing the card cage shield, the two captive screws must be tightened to 15 inch-pounds to prevent operator access into the card cage.

To reassemble, reverse steps a through e of the above procedure.

## 2-28. POWER REQUIREMENTS

### CAUTION

Do not attempt to operate a drive configured for 120 Vac on 220 Vac or vice versa. Damage to the drive will result.

The drive has been preset for the proper operating voltage before being shipped. The standard model is set for 120 Vac, 60 Hz operation and option 015 is set for 220 Vac, 50 Hz operation.

## 2-29. AC POWER OUTLET AND EXTERNAL GROUND

Have a qualified electrician check the power outlet

with an ac voltmeter to ensure that the required voltage is present (refer to table 1-3.) Also, check the earth or safety ground in the power outlet to ensure that there is a good earth ground (properly earthed ac outlet).

## 2-30. FUSE RATING CHECK

The drive is equipped with one primary power fuse (F1). Figure 2-7 indicates the location of the primary power fuse on the rear panel. The fuse value is dependent on the operating voltage; therefore, it should be checked to ensure it is the value shown in the following list:

Nominal Operating Voltage	Fuse Description	HP Part No.
100/120 Vac	10A, 250V, med-blo	2110-0051
220/240 Vac	5A, 250V, slow-blo	2110-0367

## 2-31. VOLTAGE SELECTION

The drive operating voltage is preset at the factory prior to shipment. The standard model is strapped for 120 Vac, 60 Hz operation and option 015 is strapped for 220 Vac, 50 Hz operation; 100 Vac and 240 Vac operation may also be selected. Voltage selection is accomplished by configuring terminal board TB1 in the power supply (see figure 2-8). The following list shows the four operating voltages for which the drive can be configured.

Drive Voltage Operation	Input AC Voltage Range
100V	90 to 105 Vac
120V	108 to 126 Vac
220V	198 to 231 Vac
240V	216 to 252 Vac

**2-32. STAND-ALONE DRIVE VOLTAGE STRAPPING.** To change or check the drive voltage strapping, proceed as follows:

### WARNING

To avoid dangerous electrical shock, do not perform the voltage strapping procedure until the ac mains power is removed from the drive.

- Perform preparation procedures (refer to paragraph 2-18).



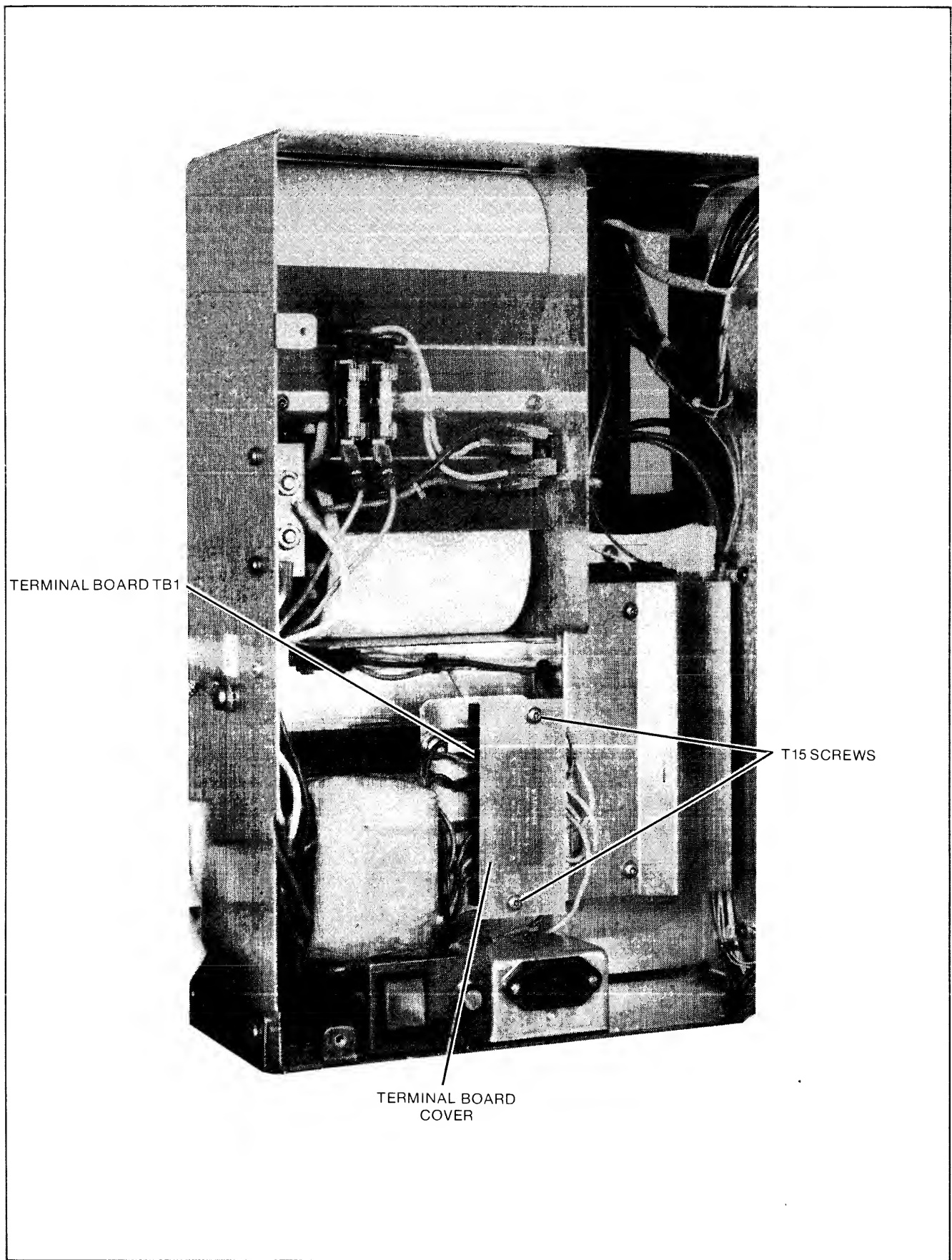
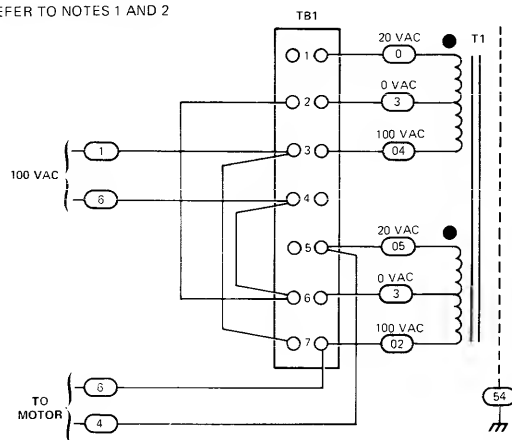


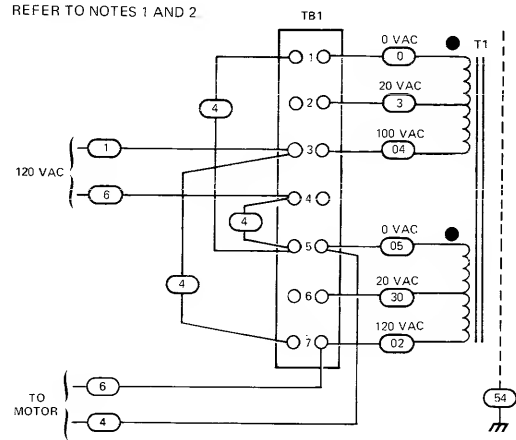
Figure 2-8. Terminal Board TB1 Identification



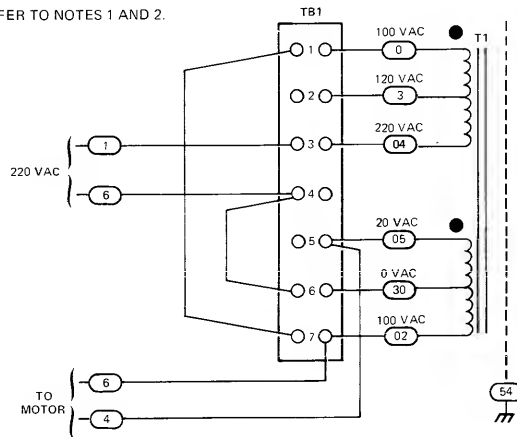
REFER TO NOTES 1 AND 2

**TB1 CONNECTIONS FOR 100 VAC OPERATION**

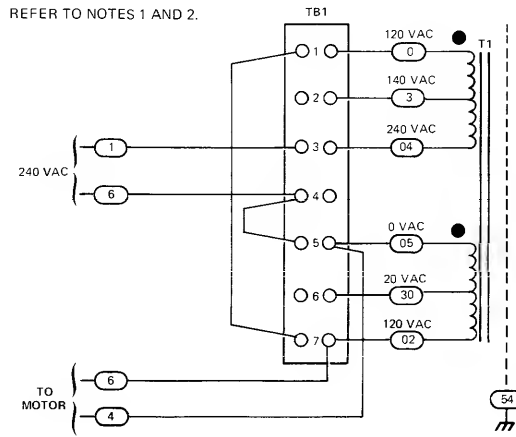
REFER TO NOTES 1 AND 2

**TB1 CONNECTIONS FOR 120 VAC OPERATION**

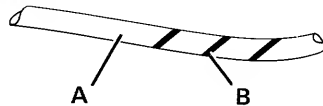
REFER TO NOTES 1 AND 2.

**TB1 CONNECTIONS FOR 220 VAC OPERATION**

REFER TO NOTES 1 AND 2.

**TB1 CONNECTIONS FOR 240 VAC OPERATION****NOTES**

1. ENCIRCLED NUMBERS INDICATE WIRING COLOR CODE AS FOLLOWS:
2. VOLTAGES INDICATED ARE MEASURED ACROSS TRANSFORMER WINDINGS



COLOR	1ST DIGIT "A"	2ND DIGIT "B"
BLACK	0	0
BROWN	1	1
RED	2	2
ORANGE	3	3
YELLOW	4	4
GREEN	5	5
BLUE	6	6
VIOLET	7	7
GRAY	8	8
WHITE	9	9

**Figure 2-9. Strapping Configurations**

- b. Disconnect the ac power cord from the ac mains power.
- c. Remove the following items:
  - Lower front panel (refer to paragraph 2-22)
  - Upper front panel (refer to paragraph 2-21)
  - Flip-top assembly (refer to paragraph 2-23)
- d. Remove the two T15 door closure screws that hold the power supply cover panel in place (see figure 2-7).
- e. Disconnect the HP-IB ribbon cable(s) from the HP-IB PCA-A14.
- f. Swing the hinged cover panel to the right, exposing terminal board TB1 (see figure 2-8).
- g. Remove the two T15 screws that mount the terminal board cover.
- h. Change the strapping configuration on TB1 of the power supply to correspond to the primary voltage being used (see figure 2-9).
- i. If necessary, change the primary power fuse (F1) to the correct value.
- j. Install the terminal board cover, tightening the two T15 mounting screws to 20 in.-lb.
- k. Close the power supply cover panel and install the two T15 attaching screws. Tighten the screws to 25 in.-lb.
- l. Change the power specification label located on the rear panel to reflect the current strapping configuration.
- c. If rackmounted, remove the drive per paragraph 2-12.
- d. Remove the two T15 door closure screws holding the power supply cover panel in place (see figure 2-7).
- e. Disconnect the HP-IB ribbon cable(s) from the HP-IB PCA-A14.
- f. Swing the hinged cover panel down, exposing terminal board TB1 (see figure 2-8).
- g. Remove the two T15 screws that mount the terminal board cover.
- h. Change the strapping configuration on TB1 of the power supply to correspond to the primary voltage being used (see figure 2-9).
- i. If necessary, change the primary power fuse (F1) to the correct value.
- j. Install the terminal board cover, tightening the two T15 mounting screws to 20 in.-lb.
- k. Close the power supply cover panel and install the two T15 attaching screws. Tighten the screws to 25 in.-lb.
- l. Change the power specification label located on the rear panel to reflect the current strapping configuration.
- m. Install the drive in the rack per paragraph 2-12.

**2-33. RACKMOUNT DRIVE VOLTAGE STRAPPING.** To check or change the drive voltage strapping, proceed as follows:

### WARNING

**To avoid dangerous electrical shock, do not perform the voltage strapping procedure until the ac mains power is removed from the drive.**

- a. Perform preparation procedures (refer to paragraph 2-18).
- b. Disconnect the ac power cord from the ac mains power.

## 2-34. FREQUENCY CONVERSION

The disc drive-spindle is driven by an induction motor through a pulley and drive belt. To maintain the proper spindle rotation speed, different pulley/drive belt combinations are required for 50 Hz and 60 Hz operation. The power specification label indicates the frequency for which the drive is currently configured.

If it is necessary to convert the drive from 50 Hz to 60 Hz, or vice-versa, the pulley and drive belt must be changed. To access the pulley and drive belt, the drive belt cover must be removed.

**2-35. STAND-ALONE DRIVE BELT COVER REMOVAL AND REPLACEMENT.** To remove the drive belt cover, proceed as follows:

- a. Perform preparation procedures (refer to paragraph 2-18).
- b. Disconnect the ac power cord from the ac mains power.
- c. Remove the following items:

- Lower front panel (refer to paragraph 2-22)
  - Upper front panel (refer to paragraph 2-21)
  - Flip-top assembly (refer to paragraph 2-23)
- d. Remove the four T15 screws that mount the drive belt cover (see figure 2-6) to the disc mechanism.

To replace the drive belt cover, proceed as follows:

- a. Ensure that the grounding strap is rotated so the hole in the strap is aligned with the nearest hole in the drive belt cover. This ensures a good ground to the spindle shaft.
- b. Place the cover on the disc mechanism and install a T15 screw in the hole aligned with the grounding strap. Tighten this screw finger tight.
- c. Replace the other three T15 screws and tighten all four screws to 20 in.-lb.
- d. Install the following items:
  - Lower front panel (refer to paragraph 2-22)
  - Upper front panel (refer to paragraph 2-21)
  - Flip-top assembly (refer to paragraph 2-23)

**2-36. RACKMOUNT DRIVE BELT COVER REMOVAL AND REPLACEMENT.** To remove the drive belt cover, proceed as follows:

- a. Perform preparation procedures (refer to paragraph 2-18).
- b. Disconnect the ac power cord from the ac mains power.
- c. If rackmounted, remove the drive per paragraph 2-12.
- d. Remove the four T15 screws that mount the drive belt cover (see figure 2-6) to the disc mechanism.

To replace the drive belt cover, proceed as follows:

- a. Ensure that the grounding strap is rotated so the hole in the strap is aligned with the nearest hole in the drive belt cover. This ensures a good ground to the spindle shaft.
- b. Place the cover on the disc mechanism and install a T15 screw in the hole aligned with the grounding strap. Tighten this screw finger tight.
- c. Replace the other three T15 screws and tighten all four screws to 20 in.-lb.
- d. Reinstall the drive per paragraph 2-12.

## 2-37. FREQUENCY CONVERSION PROCEDURE

The frequency conversion procedure involves changing the pulley and drive belt (see figure 2-10). Except for removal of the drive belt cover (step c), the procedure is identical for the rackmount and stand-alone drives. To perform the frequency conversion, proceed as follows:

- a. Perform preparation procedures (refer to paragraph 2-18).
- b. Disconnect the ac power cord from the ac mains power.
- c. Remove the drive belt cover (refer to paragraph 2-35 for stand-alone drives; refer to paragraph 2-36 for rackmount drives).
- d. Remove the spindle lock by removing the two T15 screws that mount the lock to the disc mechanism.
- e. Loosen the motor mounting screw directly opposite the tension stud 3/4 turn.
- f. Loosen the other two motor mounting screws two turns.
- g. Loosen the 8 mm nut on the tension stud.
- h. Using the motor pulley, move the motor toward the spindle and, while holding the motor in this position, tighten the 8 mm nut on the tension stud.
- i. Remove the drive belt.
- j. Using a 3/4-inch open-end wrench to hold the motor pulley across the flats, remove the 1/2-inch nut on the motor shaft.

### CAUTION

When the motor pulley is removed from the motor shaft, the woodruff key will fall free. Do not allow the key to fall into the spindle motor area.

- k. Slide the motor pulley off the motor shaft being careful not to lose the woodruff key.
- l. Verify that the motor pulley/drive belt combination to be installed is correct for the power line frequency available.

Frequency	Motor Pulley No.	Drive Belt No.
50 Hz	07912-20013	07912-40018
60 Hz	07912-20024	07912-40017

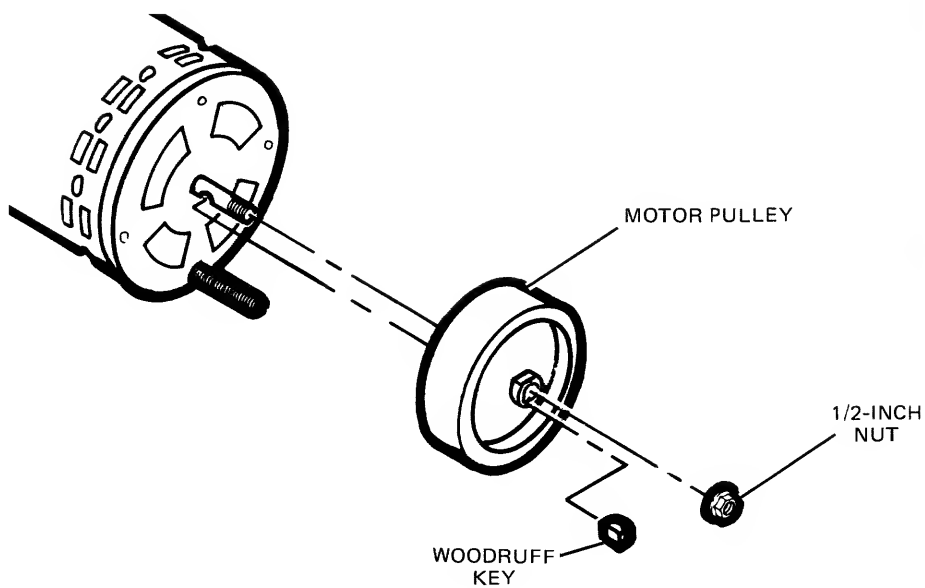
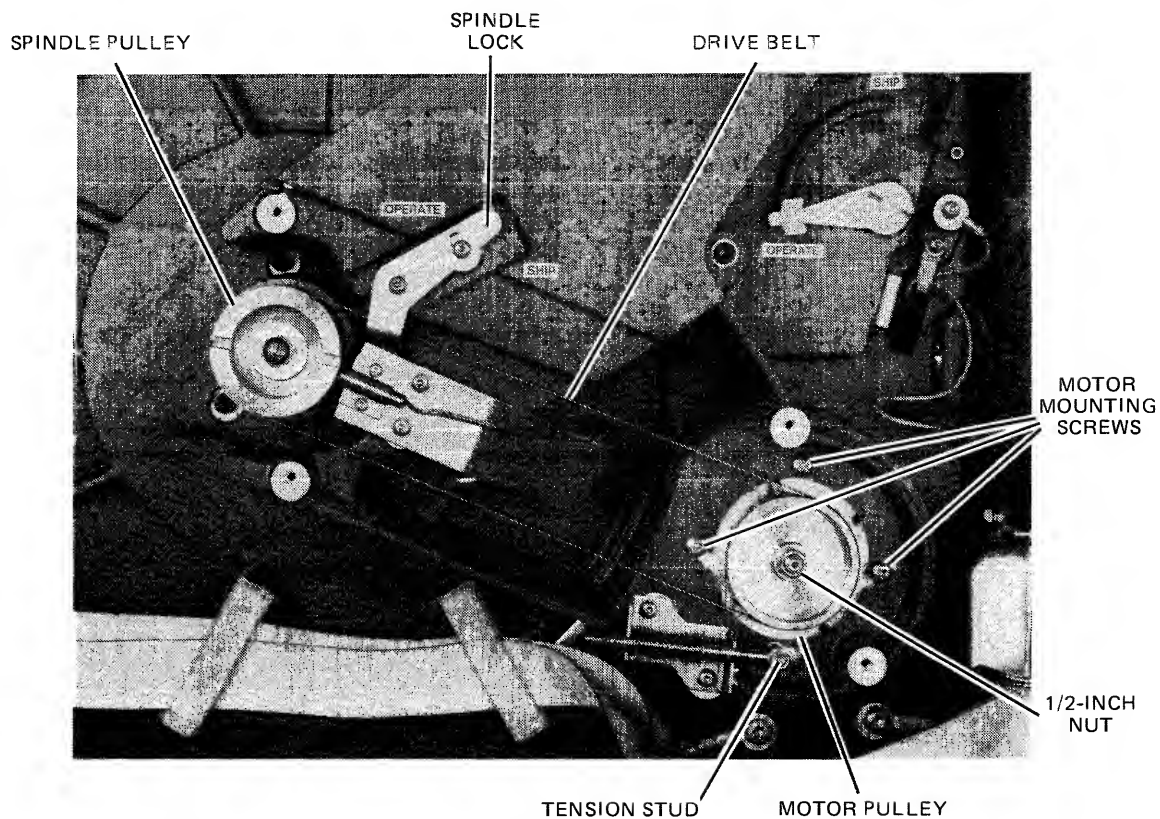


Figure 2-10. Frequency Conversion

Note: The outside diameter of the 50 Hz motor pulley is 71.2 mm (2.8 in.). The outside diameter of the 60 Hz motor pulley is 59.3 mm (2.3 in.).

- m. Position the key in the slotted motor shaft.
- n. Seat the pulley to the rear of the shaft.
- o. Install the 1/2-inch nut on the motor shaft and, while holding the pulley across the flats with a 3/4-inch open-end wrench, tighten the nut to 120 in.-lb.
- p. Place the new belt around the spindle pulley and around the motor pulley ensuring that the side of the belt with the part number stamped on it is to the outside.
- q. Loosen the 8 mm nut on the tension stud.

### CAUTION

Do not turn the spindle in a clockwise direction.

- r. Manually rotate the motor pulley counterclockwise until the drive belt is centered on the motor pulley. Also ensure that the full width of the drive belt lies on the spindle pulley.
- s. Using the tension stud, push the motor toward the rear of the drive and then release. This removes any friction in the motor mounting and allows the spring tension assembly to establish the proper drive belt tension.
- t. Tighten the 8 mm nut on the tension stud to 30 in.-lb.
- u. Tighten the three motor mounting screws to 30 in.-lb.
- v. Install the spindle lock in the OPERATE position using the two T15 lock mounting screws. Tighten the screws to 20 in.-lb.
- w. Change the power specification label located on the rear panel to reflect the frequency for which the drive is currently configured.
- x. Install the drive belt cover (refer to paragraph 2-35 for stand-alone drives; refer to paragraph 2-36 for rackmount drives).

## 2-38. POWER CORD INSTALLATION

### CAUTION

For USA operation, use only a UL listed, detachable power cord with

type SJT flexible cord, suitable for rated voltage and current. Check the input ac voltage, main fuse rating, and voltage strapping before connecting the power cord. The drive is shipped with an appropriate power cord.

### CAUTION

Do not attempt to operate a drive configured for 120 Vac on 220 Vac or vice versa. Damage to the drive will result.

Check the input ac voltage and fuse rating before proceeding with the power cord installation. The various power cords available are shown in figure 2-11.

To attach a power cord, proceed as follows:

- a. Set the power switch (see figure 2-7) on the drive rear panel to 0 (off) position.
- b. Plug the female end of the power cord into the connector on the rear panel of the drive.

## 2-39. INTERCONNECTION INSTRUCTIONS

### CAUTION

Do not connect or disconnect the HP-IB cable(s) from the drive while the system bus is in an active state.

The rackmount drives are connected to a system using the 2-metre Hewlett-Packard Interface Bus (HP-IB) cable, model no. 10833B (part no. 8120-3446); stand-alone drives are connected to a system using the 1-metre HP-IB cable, model no. 10833A (part no. 8120-3445). The interconnection of the drive is dependent on the system. The location of the HP-IB connector(s) for the drive is shown in figure 2-7. The major HP-IB considerations concerning the drive are contained in the following paragraphs.

**2-40. HP-IB CABLING.** The Hewlett-Packard Interface Bus (HP-IB) has certain rules which must be observed for successful installation of the drive. Cabling is limited to 1 metre per HP-IB load. Typically the Central Processing Unit (CPU) is 7 equivalent loads and the drive is 1 equivalent load (see figure 2-12).

The CPU adheres to an HP standard which allows 7 metres of HP-IB cable between the CPU and the nearest device connected to it and 1 metre of cable between each additional device. The maximum configuration is eight devices (excluding the CPU) per HP-IB channel or a maximum of 15 metres or 10 equivalent loads.

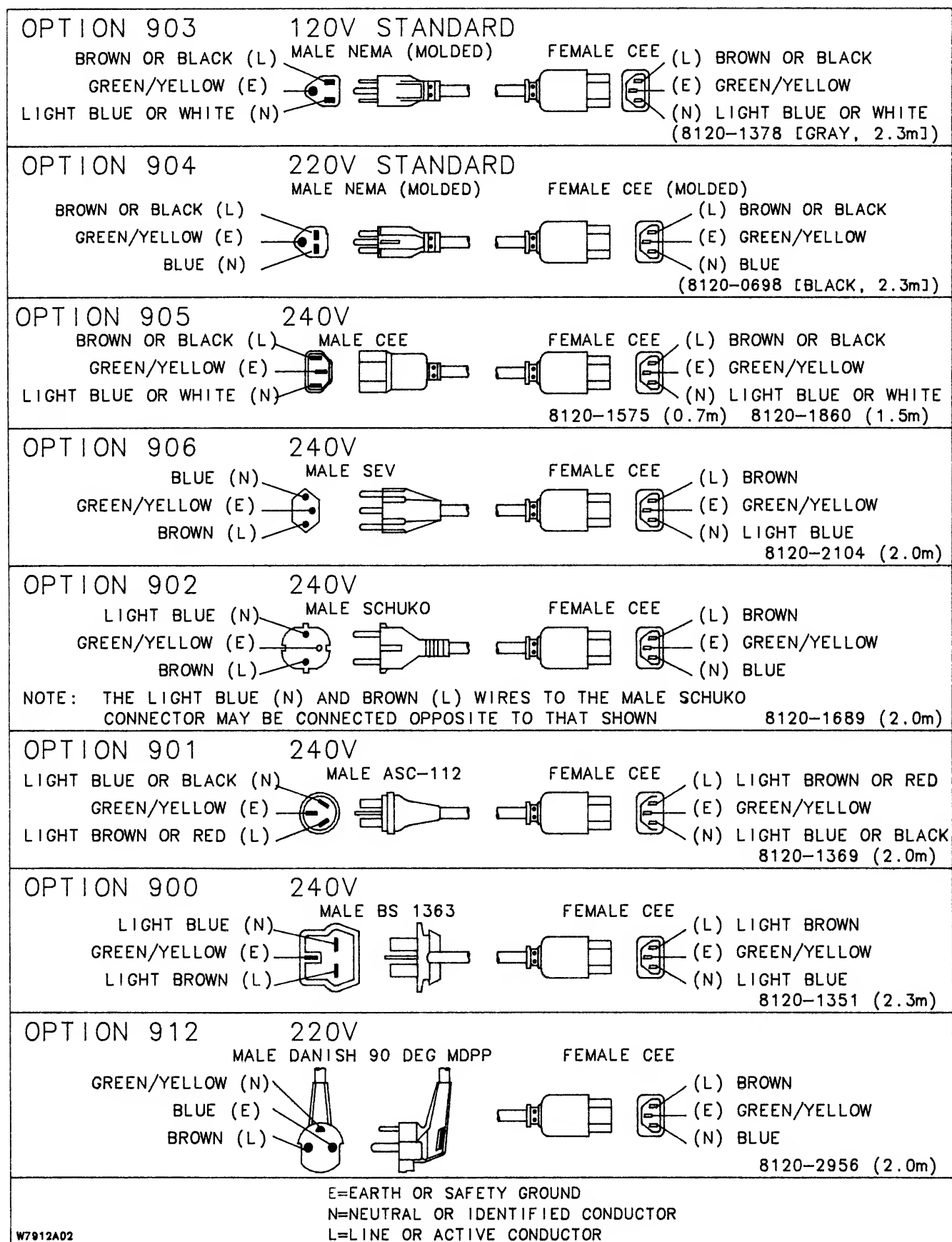
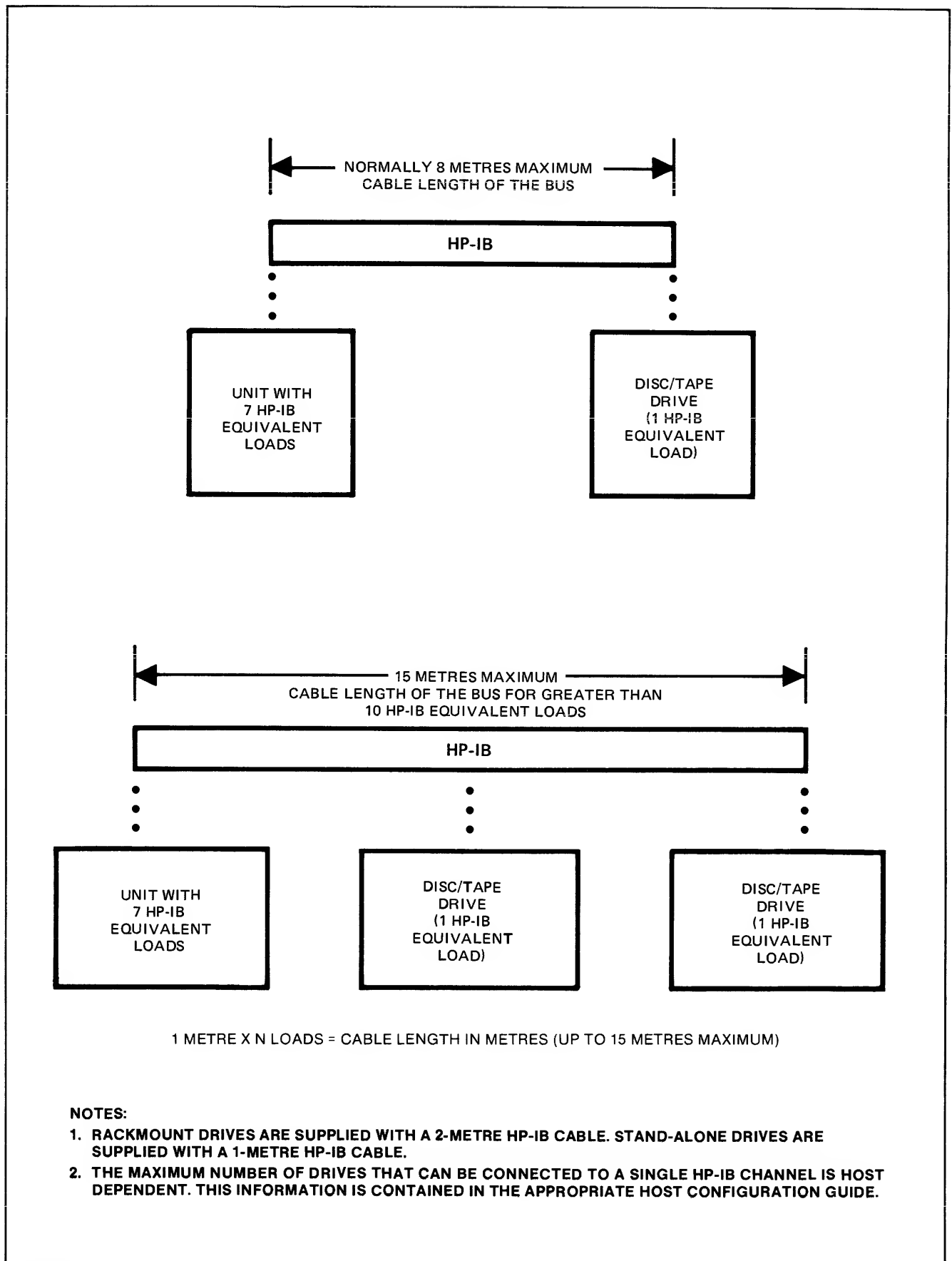


Figure 2-11. AC Power Cord Sets



REF 7908-10

Figure 2-12. Maximum Cable Length for HP-IB Channel

**Note:** The maximum number of drives that can be connected to a single HP-IB channel is host dependent. This information is contained in the appropriate host configuration guide.

**2-41. HP-IB DEVICE ADDRESS.** The HP-IB DISC address switch and the HP-IB TAPE address switch (if dual controller option 001 is installed) are located on the rear panel (see figure 2-7). The HP-IB Address Switch permits setting one of eight unique addresses. The address switches can be set with any pointed tool. Address settings, which are generally set one time, are as follows:

Switch Settings (lsb)* 1 2 3 (msb)	HP-IB Address
0 0 0	0
1 0 0	1
0 1 0	2
1 1 0	3
0 0 1	4
1 0 1	5
0 1 1	6
1 1 1	7

\*lsb = least significant bit; msb = most significant bit

**Note:** When setting the HP-IB address switch(es), disregard any markings on the switch body. Set the switches according to the markings on the rear panel.

**Note:** Check the HP-IB device address switch and ensure that no two devices in the system have the same unit address. If dual controller option 001 is installed, the two HP-IB switches on the drive must each have a unique address since the disc unit and the tape unit are addressed as separate devices.

## 2-42. INSTALLATION CHECKS

After the drive has been installed and the power connections made, visually inspect the installation. If the inspection verifies that everything is in order and correct, proceed to the power-on sequence and installation checks.

## 2-43. POWER-ON SEQUENCE

### CAUTION

Do not attempt to operate the drive if the spindle and actuator have not been unlocked.

Do not turn the drive power on or off while the system bus is in an active state.

Do not operate the drive if condensation is evident anywhere on it. Wait until all condensation has evaporated before operating the drive.

Do not operate stand-alone drives until the leveling feet have been lowered.

Set the rear panel power switch to the 1 (on) position. When power is applied to the drive, it performs an internal self test. The self test is initiated for approximately 30 seconds. Two sounds will be heard at power-on: one sound is heard as the fan comes up to speed and continues moving cooling air through the drive; the other sound occurs during the first 3 seconds and is caused by the tape stepping motor. At the completion of the self test, the letter P and a period (.) will be displayed on the status readout which is located behind the front panel and behind the foam air filter on the card cage cover. The period indicates completion of the self test and the letter P indicates that the drive has passed the self test.

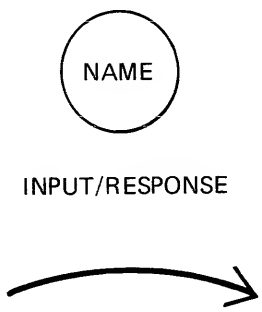
If a tape cartridge is installed in the tape unit, the drive will continue with tape loading (1 to 2 minutes) and a 3-second tape unit test. At the completion of the tape unit test, a **P.** will be displayed on the Status Readout.

Any indication other than **P.** indicates that the drive has failed one of the internal tests and requires further testing to isolate the trouble to a unique assembly. The testing is activated by the Self-Test or Diagnostic switches which are located behind the front panel and behind the foam air filter on the card cage cover.

The drive is capable of locally executing three troubleshooting routines which have been programmed into the microprocessor ROM. All routines execute thorough hardware checks. The power-on routine performs a full reset, delays certain tests until the spindle is up to speed, and tests all PCA's. The self-test routine performs the same tests as the power-on routine except that the microprocessor PCA is not reset and no delays are induced. The diagnostic routine runs the self-test routine, adds an error rate test, and forces an autoloop of the tape.

When the drive is first powered on, it is in the normal mode (see figures 2-13 and 2-14). In the normal mode, momentarily pressing the Self-Test switch will activate the self test, and momentarily pressing the Diagnostic switch will activate the diagnostics. Simultaneously pressing the Self-Test and Diagnostic switches causes a power-on to occur and is equivalent to turning the drive power switch to 0 (off) and then to 1 (on) again (see figure 2-7).



SYMBOL	DESCRIPTION
	<p><b>STATE SYMBOL.</b> This symbol indicates the current condition a device is in. The symbol contains the name of the state.</p> <p><b>INPUT.</b> Information read from an external source (such as a switch) which causes a response.</p> <p><b>RESPONSE.</b> The output caused by a certain input while in a certain state.</p> <p><b>TRANSITION.</b> The path from one state to another or from one state to itself.</p>

P/O 7908-30

Figure 2-13. State Diagram Symbols

When in the normal mode, holding either Self-Test or Diagnostic switches depressed until the display flashes causes the drive to enter the supplemental mode. The supplemental mode should only be used for troubleshooting the drive. Once in supplemental mode, a number or the letter **P** appears on the Status Readout. A **P** means that the drive passed all tests which were run. If a number appears, this indicates an error condition (see figure 2-14). Press Self-Test switch momentarily to see a two-digit error code associated with the suspect error condition which was displayed. The two digits represent an error code as shown in figure 2-14. Pressing the Diagnostic switch momentarily will show the next suspect condition, if any. Any time “-” appears on the Status Readout, the last error condition or last error code has been displayed for that assembly. For a detailed list of the error codes, refer to the *HP 7911, HP 7912, and HP 7914 Service Manual*, part no. 07912-90903.

At any time, the Self-Test or Diagnostic switches can be held until Status Readout flashes, and the results of the test run can be displayed again. To exit supplemental mode, simultaneously press both Self-Test and Diagnostic switches.

Once the first CS/80 instruction is received by the drive, background diagnostics are enabled. This permits the drive, when idle, to continually check itself. Background diagnostics monitor the controller system and the fault latch for vital information during idle states. An idle state occurs when the host CPU has not conversed with the drive for one second or more. Each time background diagnostics are completed, a **P** is displayed on the status readout; therefore, during idle states the status readout will display a **P** flashing at one second intervals.

#### 2-44. TAPE TEST SWITCHES (OPTION 001 ONLY)

If dual controller option 001 is installed, the Self-Test switch, the Status Readout, and the Diagnostic switch are used to verify disc operation only. The Tape Self-

Test switch, Tape Diagnostic switch, and Tape Status Readout are added to verify tape operation. These switches are identical in operation to the test switches explained previously.

#### 2-45. INSTALLATION CHECKOUT PROCEDURE

After the drive is powered on and the selftest completes successfully, a series of checkout procedures must be performed. When performing the checkout procedure, it is recommended that the HP CS/80 External Exerciser be used; however, CS80DIAG (HP 3000 systems) or EXER (HP 1000 systems) may also be used. For a detailed description of the exerciser, refer to the *CS/80 External Exerciser Reference Manual*, part no. 5955-3462.

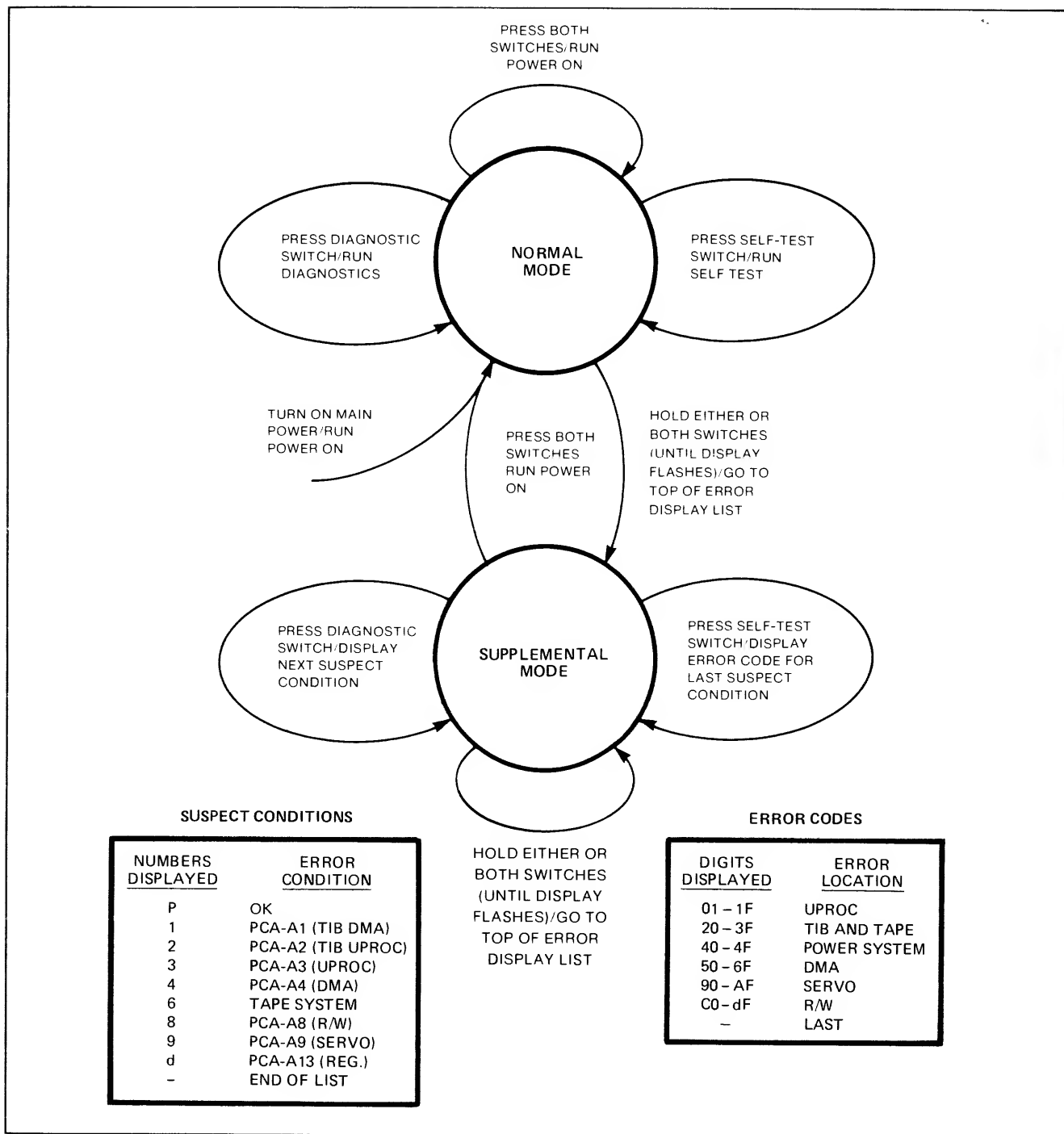
To perform the checkout, proceed as follows:

- Initialize the media (INIT MEDIA) retaining primary spares (option P).

#### CAUTION

Initialization of the maintenance tracks (option I) can only be performed using firmware REV 5.0 and later. The exerciser REV command can be used to determine what firmware revision is installed in the drive.

- Initialize the maintenance tracks (INIT MEDIA, option I).
- Perform one pass of a full-volume WTR ERT.
- Read the ERT log and the Fault log. Spare any uncorrectable errors logged in the ERT log. Isolate and repair any faults logged in the Fault log.
- Power cycle the drive and ensure that the Status Readout indicates a successful power-on selftest ( **P** ). If the selftest was not successful, the problem must be isolated and the drive repaired.



REF 7908-31

Figure 2-14. Internal Diagnostic States

## 2-46. CONTROLLER INSTRUCTION SET

The drive contains a controller that responds to the Hewlett-Packard CS/80 Instruction Set. This instruction set has been written to increase the efficiency and speed of channel operations between mass storage devices and their associated computers. This instruction set is detailed in the *CS/80 Instruction Set Programming Manual*, part no. 5955-3442.

## 2-47. REPACKAGING FOR SHIPMENT

When the drive requires repackaging for shipment, use the original container and packing material. If the container is not available, consult your local Hewlett-Packard Sales and Support Office regarding shipment. Sales and Support Offices are listed at the back of this manual. Before shipment, the container (or equipment) should have a tag identifying the owner and the service or repair to be performed. Include the equipment model number and full serial number.

## 2-48. RACKMOUNT DRIVE REPACKAGING

### CAUTION

To avoid damage to the drive, the spindle and actuator must be locked before the drive is repackaged for shipment (refer to paragraph 2-25).

- Pull the front panel from the drive.
- Place the bubble plastic on the pallet base (see figure 2-1).
- Place the drive in a plastic bag and put it on the base.
- Secure the drive to the pallet base using 1/2-inch polystrip binding.
- Place the protective cover on the drive.
- Wrap the front panel in bubble plastic.
- Place the wrapped front panel on the protective cover.
- Place the container top over the drive and secure it to the pallet base using 1/2-inch polystrip binding.

## 2-49. STAND-ALONE DRIVE REPACKAGING

To repackage stand-alone drives, proceed as follows:

### CAUTION

To avoid damage to the drive, the spindle and actuator must be locked before the drive is repackaged for shipment (refer to paragraph 2-26).

### CAUTION

On stand-alone drives with serial numbers prefixed 2242 and prior, disconnect the 50-pin data cable from the tape module before repackaging the drive for shipment (refer to paragraph 2-49).

- Place the main pallet base on edge (see figure 2-3).
- Cover the drive with a plastic bag.
- Position the drive so the side is flush with the inside of the main pallet base.
- Secure the drive to the pallet base using the corrugated corner protector and 1/2-inch polystrip binding.
- Lay the main pallet base flat on the floor (see figure 2-2).

- Move the pallet end flush to the end of the main pallet base (see figure 2-2).
- Replace and tighten the two 9/16-inch bolts.
- Place the protective cover over the drive.
- Place the container top over the drive and secure it to the pallet base using 1/2-inch polystrip binding.

**2-50. DISCONNECTING THE STAND-ALONE DRIVE TAPE DATA CABLE.** On stand-alone drives with serial numbers prefixed 2242 and prior, the 50-pin tape data cable may be damaged if not disconnected from the tape module before repackaging the drive for shipment.

To disconnect the tape data cable, proceed as follows:

- Perform preparation procedures (refer to paragraph 2-18).
- Disconnect the ac power cord from the ac mains power.
- Remove the following items:
  - Lower front panel (refer to paragraph 2-22)
  - Upper front panel (refer to paragraph 2-21)
  - Flip-top assembly (refer to paragraph 2-23)
- Disconnect the tape data cable from the rear of the tape module (see figure 2-15).

To reassemble, install the three items removed in step c.

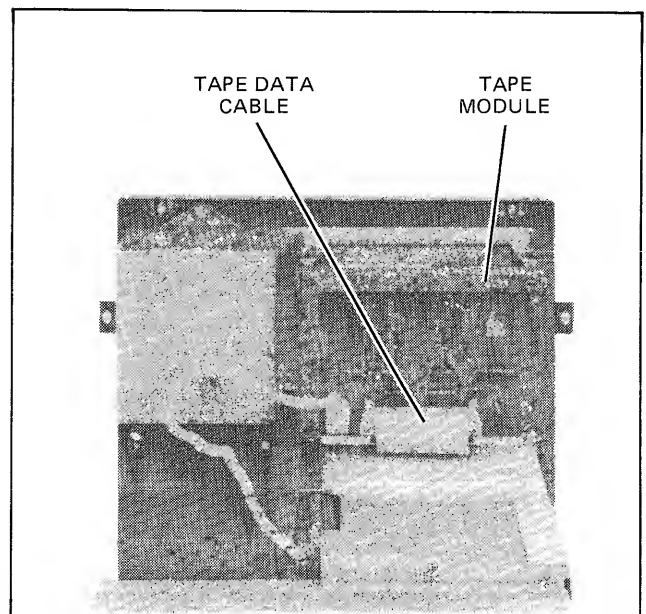


Figure 2-15. Tape Data Cable Location

# OPERATING INSTRUCTIONS

SECTION

III

## 3-1. OPERATING PRECAUTIONS

The operator should observe the following precautions when operating the drives:

### WARNING

**The drive does not contain operator-serviceable parts. To prevent electrical shock, refer all installation and service activities to service-trained personnel.**

### CAUTION

Do not touch the tape. Do not attempt to clean the tape or tape guides within the cartridge.

Do not attempt to remove a tape cartridge until the tape cartridge unloading sequence has completed.

Do not use excessive force on the tape Eject lever. It will operate only if the tape unloading sequence has successfully completed.

Do not start up or shut down the drive when the system bus is in an active state.

Do not connect or disconnect the HP-IB cable(s) from the drive when the system bus is in an active state.

Before an uncertified tape can be used in any host-initiated data operations, it must be certified by the host computer.

- Heed all WARNING and CAUTION labels affixed to the drive.
- Avoid cycling the drive power on and off unnecessarily.
- Only service-trained personnel are qualified to unpack and install the drive.
- Do not clean the tape unit capstan or head with a cleaning swab other than the one listed in the cleaning procedures.
- When not in use, all tape cartridges should be removed from the tape unit and stored in the protective plastic case. If tape cartridges are left in the

tape unit, they may deform the rubber capstan and may collect excessive amounts of dust and dirt.

- Tape cartridges should not be left in excessively warm, dry, or humid areas, direct sunlight, or areas where magnetic fields are present (e.g., motors, transformers, etc.).
- Tape cartridges should not be operated at temperatures below 10°C (50°F) or above 40°C (104°F) or stored at temperatures below -40°C (-40°F) or above 65°C (149°F).
- Do not drop tape cartridges or subject them to rough handling.
- To protect data stored on the tape cartridge, turn the safe arrow in the corner of the tape cartridge to SAFE.

## 3-2. CONTROLS, CONNECTORS, AND INDICATORS

Figure 3-1 identifies the drive controls, connectors, and indicators.

### 3-3. BUSY INDICATOR

The BUSY indicator, when lit, indicates that a tape operation is in progress. In addition, the BUSY light is used during save and restore operations to indicate the current state of the operation (refer to paragraph 2-42).

### 3-4. PROTECT INDICATOR

#### CAUTION

A power loss during a tape read operation could cause an unwanted write to occur. A tape should be "write-protected" by turning the screw on the cartridge to the "SAFE" position when the tape is not to be written to.

The PROTECT indicator illuminates when the cartridge presently in the tape unit has been set to SAFE. This is done by turning the screw on the cartridge so that the arrow points toward the area marked SAFE.

### 3-5. EJECT LEVER

#### CAUTION

Do not force the Eject lever.

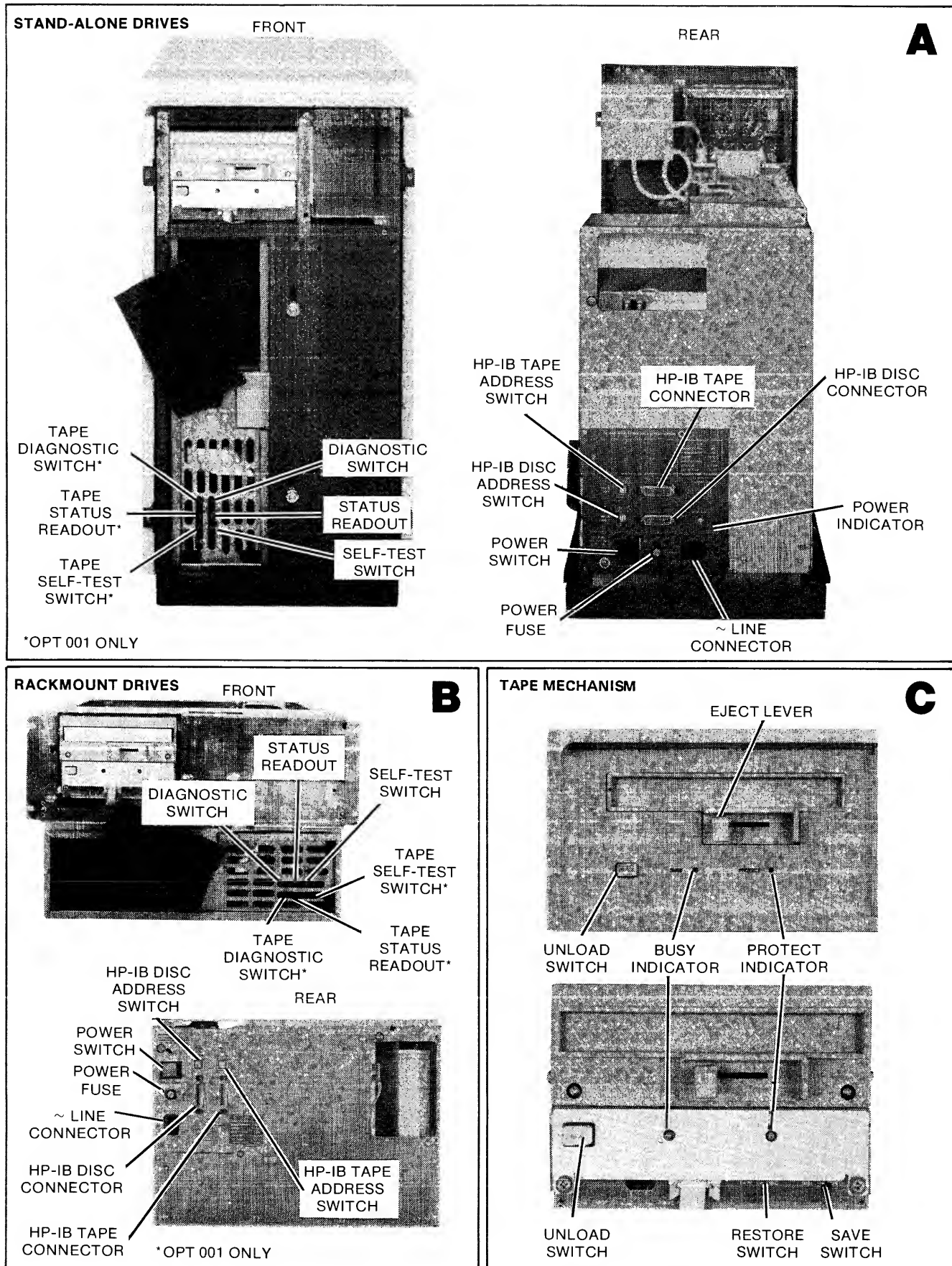


Figure 3-1. Controls, Connectors, and Indicators

The Eject slide lever ejects the cartridge out of the tape unit. An interlock prevents the cartridge eject from working unless the cartridge has been unloaded as described in paragraph 3-21.

### 3-6. UNLOAD SWITCH

**Note:** When used in the context of the following paragraphs, the term “unload” implies a *logical* operation that is performed by the drive. Once the tape has been unloaded, the Eject lever is used to *physically* remove the tape cartridge from the tape mechanism.

When the UNLOAD switch is pressed, the controller will request release from the host. Once release is granted, the controller updates the error logs near the front of tape (if necessary), rewinds the tape to “End of Tape” (EOT), updates the Use log, and unlocks the cartridge with an audible buzz. The switch, if pressed during an autoloader, will stop the autoloader and perform an unload operation. If pressed during a save or restore operation, it will temporarily stop those operations. If it is then pressed a second time and while the BUSY light is flickering, an unload operation will occur. If it is not pressed in 5 seconds, the save or restore operation will resume. Pressing the UNLOAD switch during any other active operation initiates a request release sequence with the host before unloading the tape. The unload sequence can also be executed from the system via an UNLOAD command.

**Note:** On drives equipped with the dual controller option (001), the SAVE and RESTORE switches are inoperative. System commands must be used to do back-up on drives configured with this option.

### 3-7. SAVE SWITCH

A full volume (the entire disc) can be copied to the tape cartridge by using the SAVE switch, located on the front of the switch PCA. Save (SW1-L) can be done only when the tape system BUSY light (LAMP1) is off. The save operation does not require any host intervention, therefore it can be performed while the drive is on or off line; however, when on line, the drive must request release from the host to perform a save. To initiate a full volume (image) backup of the disc, press the SAVE switch once; within 4 seconds the BUSY light should begin to flicker (eight times per second). While the light is flickering, press the SAVE switch again to begin the backup.

If a save is attempted while the drive is on line, the BUSY light may not flicker indicating that the host has not granted release and that the save operation will not be performed. If this occurs, the save operation should be retried by pressing the SAVE switch again.

The transfer will start from logical block 0 on the disc and tape, and proceed until the disc volume has been completely transferred, or end of volume occurs on the tape. After the last block is written to the tape, a file mark is written in the following block. When SAVE is successfully completed, the cartridge is unloaded. If, during the transfer, a data error is encountered on the disc, the best guess is sent to the tape, and the save operation continues to completion; however, the tape is not unloaded and the BUSY light flashes (once per second) indicating that a data error has occurred. Pushing the UNLOAD switch at this time unloads the cartridge and clears the fault conditions.

Any unreadable keys detected on the tape during a save operation are marked in the spare table and skipped; the operation continues to conclusion with no fault indicated, and the cartridge is unloaded. If a hardware fault occurs during the save, the BUSY light flashes (if possible) and the tape is stopped at its current position. The tape is unloaded but the logs at each end of the tape are not updated. After a hardware fault, the subsystem returns from release with the appropriate failure status.

Two tapes are required to perform a save operation on the HP 7914. When the first tape is full, the save operation stops, the tape is unloaded, and the BUSY light alternately flickers for one-half second and extinguishes for one-half second; this repetitive pattern prompts the user to remove the first tape and install the second one. When the second tape is installed, the save operation continues until the entire disc contents have been transferred. The address of the first disc sector copied to each tape is logged in the copy data table of that tape. This address is used by the HP 7914 when restoring data to the disc from the tapes.

If it is necessary to backup only a portion of the HP 7914, the save operation can be stopped after the first tape is full. This is accomplished by pressing the UNLOAD button which will cause the BUSY light to flicker continuously for 5 seconds. If the UNLOAD switch is pressed again while the light is flickering, the save operation will be terminated. If the UNLOAD switch is not pressed a second time, the drive will resume the save and continue to wait for the second tape to be installed.

### 3-8. RESTORE SWITCH

The RESTORE switch, located on the front of the switch PCA, performs the same function as the SAVE switch but in reverse: the entire contents of the tape are copied to the disc. In all other aspects the operation of the RESTORE switch is identical to the operation of the SAVE switch.

When restoring an HP 7914, the order in which the two tapes are installed is unimportant. The beginning disc sector address stored in the tape's copy data table ensures that the disc is restored in the proper format.

Note: Tapes that contain the image backup of an HP 7911 or HP 7912 can be used to restore an HP 7914. The drive will transfer the entire contents of the tape to the disc beginning at disc address 0.

### 3-9. HP-IB CONNECTOR

The HP-IB DISC connector provides cable interface between the drive and CPU. If dual controller option 001 is installed, the HP-IB TAPE connector is used to interface to the tape unit and the HP-IB DISC connector provides interface to the disc unit only.

Note: The Self-Test switch, the Status Readout, and the Diagnostic switch are all located behind the front panel and behind the foam air filter on the card cage cover.

### 3-10. SELF-TEST SWITCH

Pressing the Self-Test switch initiates an internal self test. This test verifies the operational condition of the drive. The results of this self test are indicated by the Status Readout. If dual controller option 001 is installed, the Tape Self-Test switch is added to verify tape unit operation and the Self-Test switch is used to test the disc unit only.

### 3-11. STATUS READOUT

The Status Readout is used to indicate drive operational status and the results of the self test internal diagnostics during troubleshooting. If dual controller option 001 is installed, the Tape Status Readout is added to display the operational status of the tape unit and the Status Readout is used to display the disc unit status only.

### 3-12. DIAGNOSTIC SWITCH

Pressing the Diagnostic switch initiates an internal diagnostic test. This test verifies the overall operation of the drive by performing an extensive seek and verify test. The results of this test are indicated on the Status Readout. If dual controller option 001 is installed, the Tape Diagnostic switch is used to initiate diagnostics on the tape unit and the Diagnostic switch verifies the operation of the disc unit only.

### 3-13. HP-IB ADDRESS SWITCH

The HP-IB DISC address switch and the HP-IB TAPE address switch (if dual controller option 001 is installed) are accessible through the rear panel (see figure 3-1). The HP-IB Address Switches permit setting one of eight unique addresses. The address switches can be set with any pointed tool. Address settings, which are generally set one time, are as follows:

Switch Settings				HP-IB Address
(lsb)*	1	2	3 (msb)	
	0	0	0	0
	1	0	0	1
	0	1	0	2
	1	1	0	3
	0	0	1	4
	1	0	1	5
	0	1	1	6
	1	1	1	7

\*lsb = least significant bit; msb = most significant bit

### 3-14. FUSE

#### WARNING

**The fuse is not an operator serviceable component and should only be replaced by service-trained personnel.**

The fuse provides protection from an ac power overload. The current and voltage ratings and the HP part numbers of the required fuses are listed below.

Source Voltage	Required Rating	HP Part Number
100/120 Vac	10A, 250V, med-blo	2110-0051
220/240 Vac	5A, 250V, slow-blo	2110-0367

### 3-15. LINE CONNECTOR

The three terminal power line connector provides the means to connect ac power to the drive.

### 3-16. POWER SWITCH

The rear panel power switch controls application of ac power to the drive power supply and blower motor. Power "on" condition is with this switch in the 1 (on) position. The 1 and 0 correspond to international symbology in use.

### 3-17. POWER INDICATOR

This indicator, a small, red, light-emitting diode (LED) located on the rear of the drive, indicates the operating status of the power supply. The Power indicator will be illuminated if all dc operating voltages are present. The loss of any dc operating voltage will cause the LED to extinguish.

### 3-18. TAPE CARTRIDGE INFORMATION

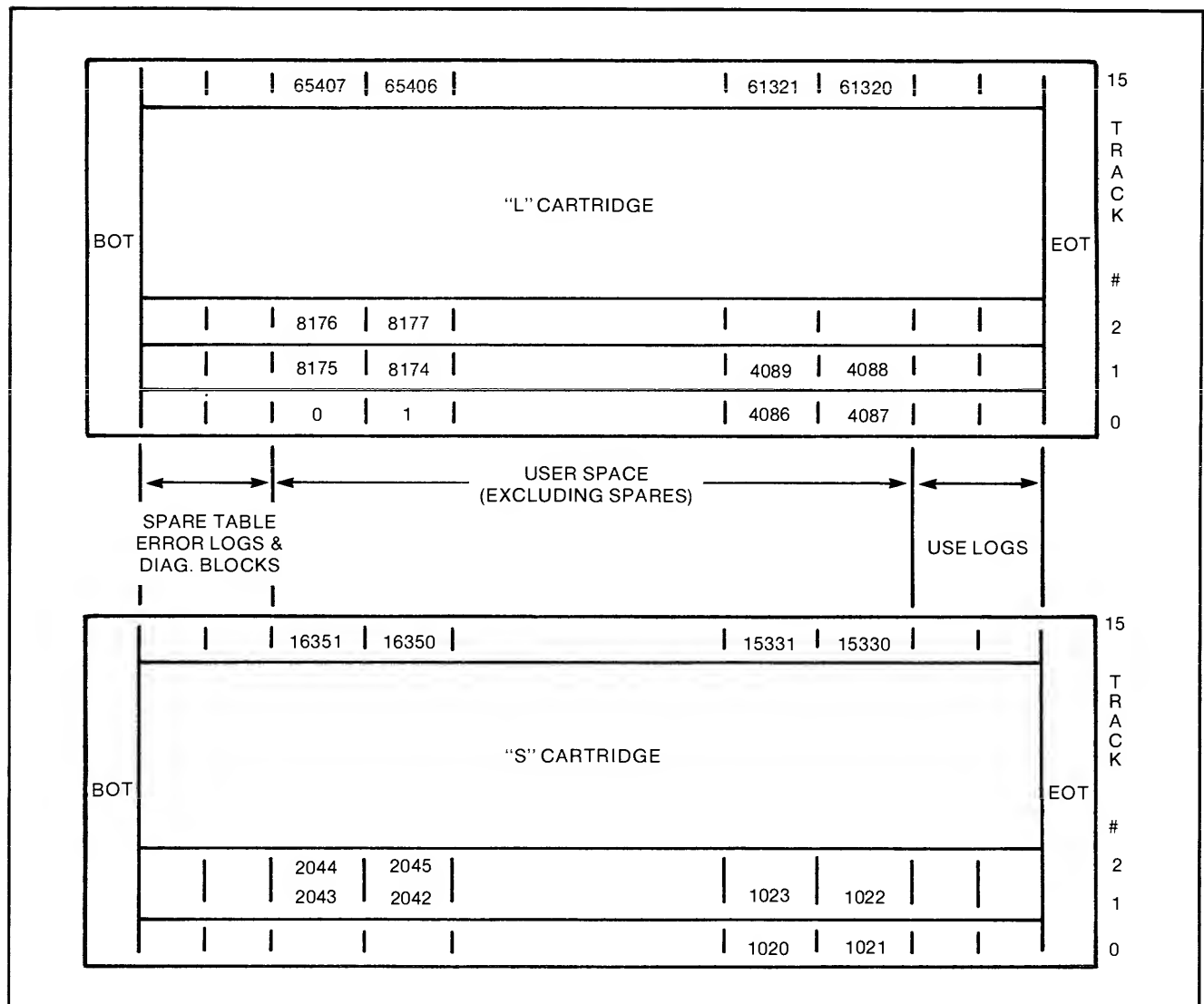
#### 3-19. TAPE CARTRIDGE DESCRIPTION

The cartridge is a DC 600 type preformatted data cartridge. Two sizes are available: the 67 megabyte cartridge with 600 feet of tape, and the 16.7 megabyte cartridge with 150 feet of tape. The formatted blocks include space for 1 kbyte of data, error correction, block addresses, and error detection. Figure 3-2 illustrates the tape cartridge formats. A mechanical write protect key is built into the cartridge also.

#### 3-20. TAPE CARTRIDGE LOADING

To load the tape cartridge into the tape unit, proceed as follows (see figure 3-1 for tape unit controls):

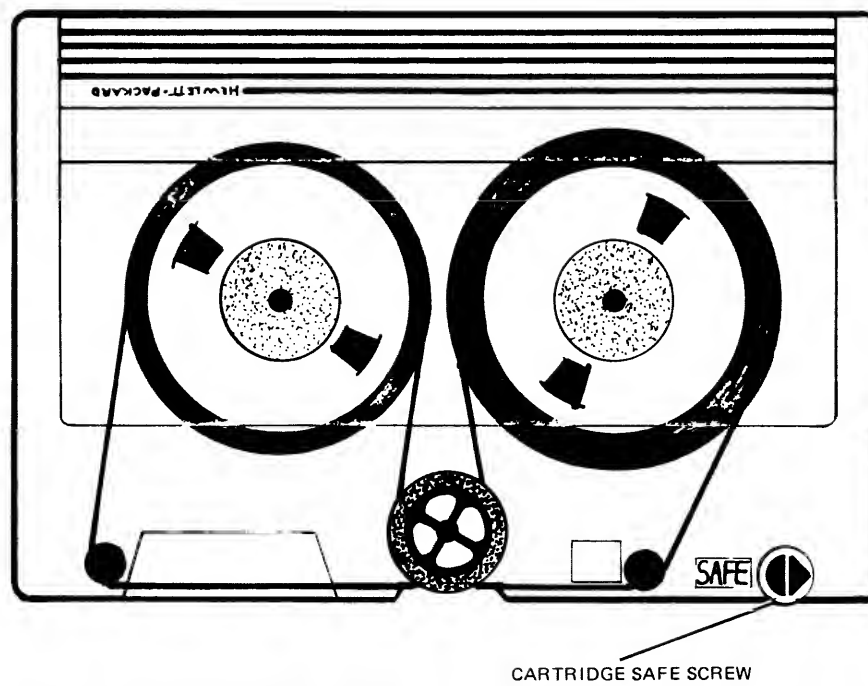
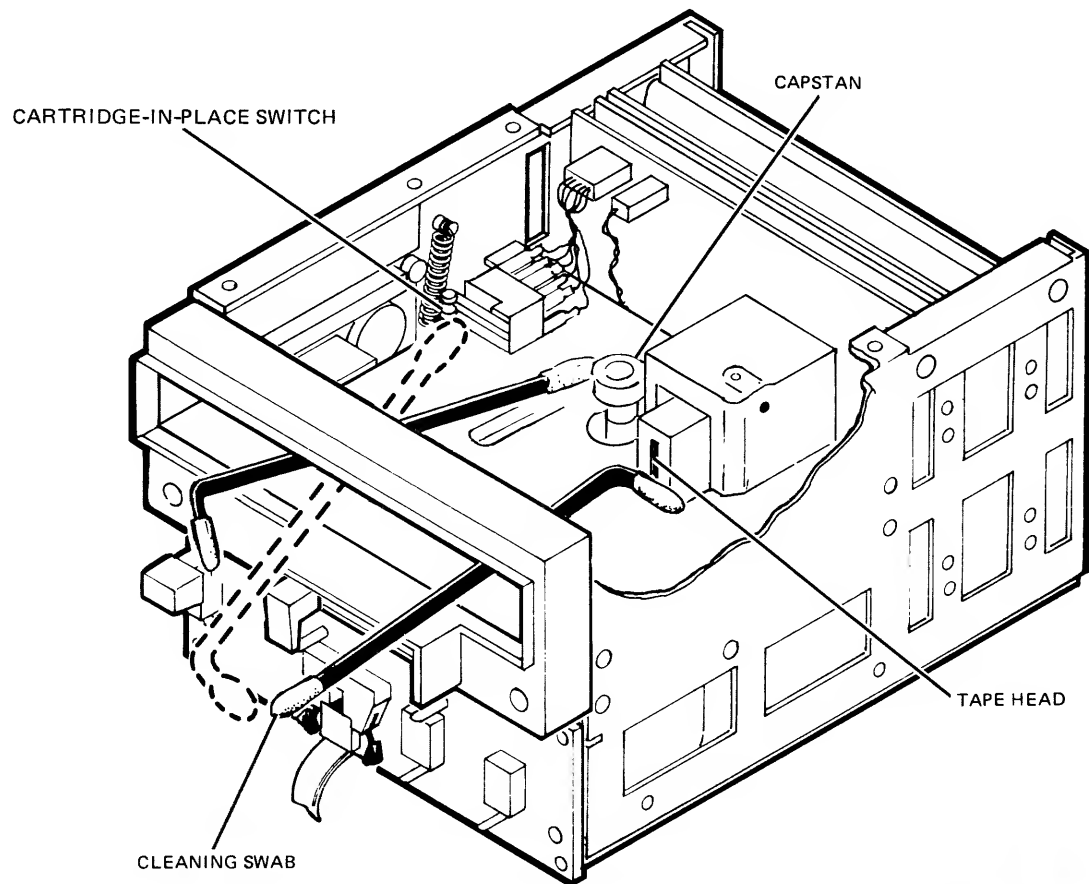
- Remove the tape cartridge from the plastic case.
- Set the tape cartridge safe screw (see figure 3-3) to the desired position. This screw is used to protect the data stored on the cartridge. When the arrow points to SAFE, information cannot be written on the tape cartridge. When the arrow is in the opposite direction from SAFE, the tape can be written on with the possible loss of previously stored data. If a tape cartridge set to SAFE is installed in the tape unit, the PROTECT indicator will illuminate.



7908-11



Figure 3-2. Tape Cartridge Formats





7912-22

Figure 3-3. Tape Unit Cleaning and Tape Cartridge Identification

- c. Place the tape cartridge at the tape unit door. The SAFE label on the tape cartridge should be toward the upper left-hand corner. Insert the tape cartridge into the door and push until a click is heard. This indicates that the tape is installed properly.
- d. The drive will immediately start a tape cartridge conditioning sequence where the tape is positioned to the end of the tape and back to the beginning of the tape. During this period of time, the BUSY indicator will be illuminated. This indicator is illuminated any time the tape unit is in motion. This conditioning technique prevents loss of data or poor operation due to low tape tension. Tape conditioning will take from 1 to 2 minutes depending on the model of the tape cartridge installed.
- e. At the completion of tape cartridge conditioning, the drive will immediately run an internal self test. The BUSY light will light and go out several times during this test as the tape motion is started and stopped. At the completion of tape unit self test (approximately 3 seconds), the BUSY light will go out and a  should be displayed on the status readout (or on the tape status readout if option 001 is installed). Any indication other than  means that the drive requires the attention of service-trained personnel (refer to paragraph 2-42).

### 3-21. TAPE CARTRIDGE UNLOADING

To unload the tape cartridge, proceed as follows:

#### CAUTION

Do not attempt to remove a tape cartridge until the tape cartridge unloading sequence has completed.

- a. Press the UNLOAD button.
- b. Wait for the tape cartridge to rewind. The BUSY indicator will be illuminated while the tape is rewinding and extinguished when the rewind operation is complete. A buzzing noise will also be heard.

#### CAUTION

Do not use excessive force on the tape Eject lever.

- c. To remove the tape cartridge, move the Eject lever to the right. The tape cartridge will eject from the tape unit.
- d. Ensure that the tape cartridge SAFE screw is in the desired position. Place the tape cartridge in the protective plastic case.

## 3-22. TAPE DRIVE MAINTENANCE

### WARNING

All products which utilize tape head cleaner are shipped with a Material Safety Data Sheet (MSDS). Follow all applicable safety precautions when using the tape head cleaner.

### CAUTION

Do not touch the tape. Do not attempt to clean the tape or tape guides within the cartridge.

The maintenance required to keep the tape unit working properly is minimal. Once a week the capstan and head should be cleaned. Each drive is shipped with foam cleaning swabs (package of 10) and a bottle of head cleaner. The swab has two cleaning ends. The straight end is used to clean the capstan and the right-angle end is used to clean the head. Figure 3-3 illustrates the tape unit cleaning procedure.

## 3-23. TAPE CAPSTAN CLEANING

### CAUTION

When initiating the tape mechanism cleaning procedure, do not press the cartridge-in-place switch more than once or hold it down for more than 1 second. If either of these conditions occur, a unit fault will be logged and reported to the host computer; it will also be necessary to restart the cleaning operation.

Slightly dampen the straight end of the cleaning swab with head cleaner. Hold the tape drive door open and insert the cleaning swab. (The tape interior is shown for clarity in figure 3-3.) Use the swab to momentarily press and release the cartridge-in-place switch; after a 2-second delay, the tape head is raised and the capstan rotates. To clean the rotating capstan, hold the swab against its left side.

## 3-24. TAPE HEAD CLEANING

Slightly dampen the right-angle end of the cleaning swab with head cleaner. Hold the tape unit door open and insert the cleaning swab. (The tape unit interior is shown for clarity in figure 3-3.) Wipe the ceramic head surface with an up and down motion. Use the swab to press and release the cartridge-in-place switch to stop capstan rotation and to return the tape head to its starting position.

Note: The tape stepping motor will make a “buzzing” sound as the head is stepped down; this is normal.

Note: Do not reuse cleaning swabs; discard after use.

### **3-25. POWER-DOWN SEQUENCE**

To power-down the drive, proceed as follows:

- a. Unload and remove any tape cartridge, using the instructions given in paragraph 3-21.
- b. Set the rear panel power switch to 0 (off).